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Differential pressure transmitter DPT10 - metal measuring diaphragm

4 … 20 mA/HART

Document ID:
37244

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Supplementary documentation

Information:
Supplementary documents appropriate to the ordered version come with the delivery. You can find them listed in chapter "*Product description*".

Instructions manuals for accessories and replacement parts

Tip:
To ensure reliable setup and operation of your instrument, we offer accessories and replacement parts. The corresponding instructions manuals are:

- 31550 - External indicating and adjustment unit

1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained qualified personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used

Information, tip, note
This symbol indicates helpful additional information.

Caution: If this warning is ignored, faults or malfunctions can result.
Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.
Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.

Ex applications
This symbol indicates special instructions for Ex applications.

- **List**
  The dot set in front indicates a list with no implied sequence.

→ **Action**
This arrow indicates a single action.

1 **Sequence**
Numbers set in front indicate successive steps in a procedure.

2 For your safety

2.1 Authorised personnel

Mount and set up the pressure transmitter only if you know the applicable national regulations and have the appropriate qualification. You must be aquainted with the regulations and instructions for hazardous areas, measurement and control technology as well as electrical circuits because the pressure transmitter is "electrical equipment" according to EN 50178. Depending on the application conditions, it is necessary that you have appropriate knowledge, e.g. concerning corrosive products or high pressure.

2.2 Appropriate use

DPT10 is a differential pressure transmitter for measurement of flow, level, differential pressure, density and interface.

You can find detailed information on the application range in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards as well as all prevailing safety regulations and accident prevention rules.

The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the required occupational safety measures with the current valid rules and regulations and also take note of new regulations.

2.5 Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

2.6 CE conformity

This device fulfills the legal requirements of the applicable EC guidelines. By attaching the CE mark, we provide confirmation of successful testing.

2.7 Fulfillment of NAMUR recommendations

The device fulfills the requirements of the applicable NAMUR recommendations.

2.8 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

2.9 Safety instructions for oxygen applications

For instruments in oxygen applications the special instructions in chapters "*Storage and transport*", "*Mounting*" as well as "*Technical data*" under "*Process conditions*"must be noted. Furthermore the valid national regulations, implementation instructions and memorandums of the BG (professional assoc.) must be noted.

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- DPT10 differential pressure transmitter
- Depending on the version ventilation valves and/or closing screws
- Optional accessory
- Documentation
  - this operating instructions manual
  - Test certificate for pressure transmitters
  - Operating instructions manual "*Indicating and adjustment module*" (optional)
  - Ex-specific "*Safety instructions*" (with Ex-versions)
  - if necessary, further certificates

Constituents

The following illustration shows the components of DPT10:

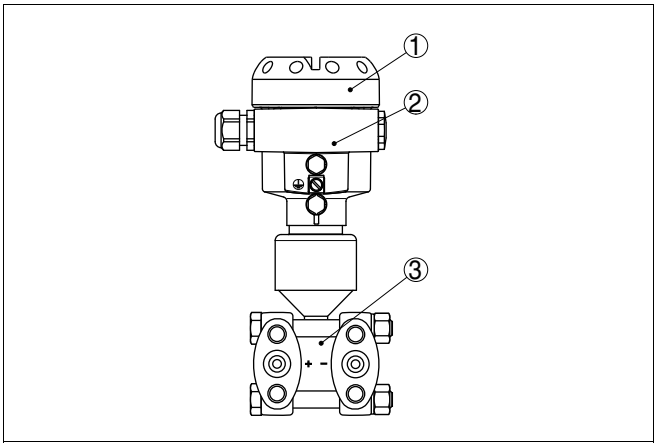


Fig. 1: DPT10 in basic version

1 Housing cover, optionally with integrated indicating and adjustment module
2 Housing with electronics
3 Process components with measuring cell

The components are available in different versions.

Type label

The type label contains the most important data for identification and use of the instrument:

- Instrument type
- Article number instrument
- Ex approval
- Technical data: Measuring range, process pressure, process temperature, signal output, voltage supply, protection, protection class
- Order number, serial number instrument

- Hardware and software version
- Article numbers, documentation

3.2 Principle of operation

Application area

DPT10 is a differential pressure transmitter for measurement of flow, level, differential pressure, density and interface. Measured products are gases, vapours and liquids.

Flow measurement

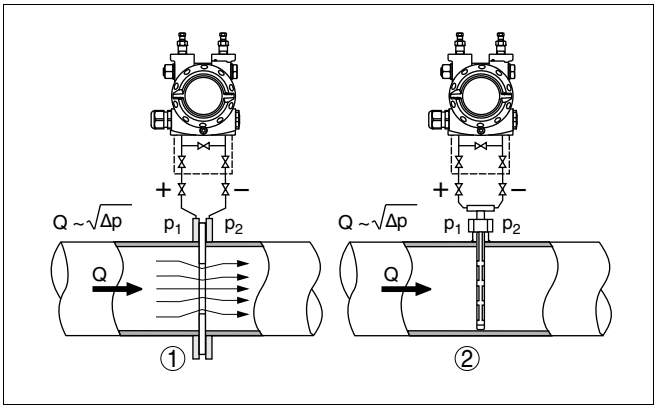


Fig. 2: Flow measurement with DPT10 and effective pressure transmitter, Q = flow, Δp = differential pressure, Δp = p_1 - p_2

1 Orifice
2 Dynamic pressure probe

Level measurement

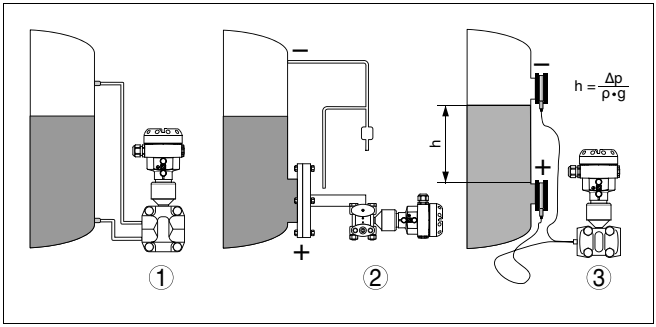


Fig. 3: Level measurement with DPT10. Δp = differential pressure, ρ = density of the medium, g = acceleration of gravity

1 Basic version with effective pressure lines
2 Version with flange isolating diaphragm
3 Version with capillaries and cell isolating diaphragms

Differential pressure measurement

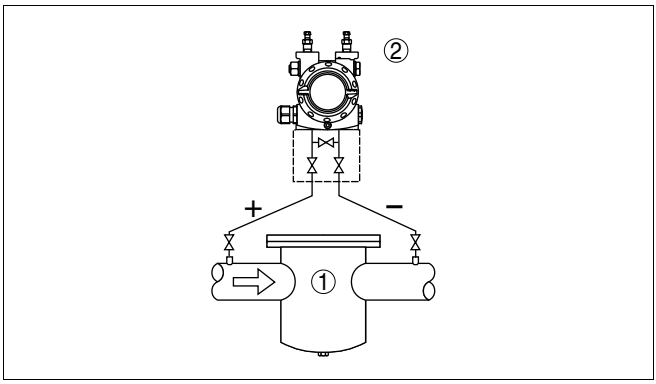


Fig. 4: Differential pressure measurement with DPT10

1 Filter
2 DPT10

Density measurement

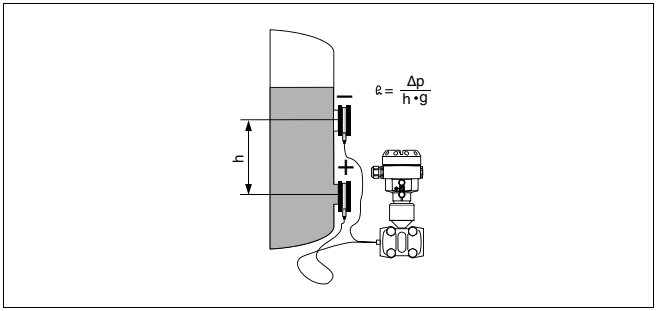


Fig. 5: Density measurement with DPT10, h = defined mounting distance, Δp = differential pressure, ρ = density of the medium, g = acceleration of gravity

1 DPT10

Interface measurement

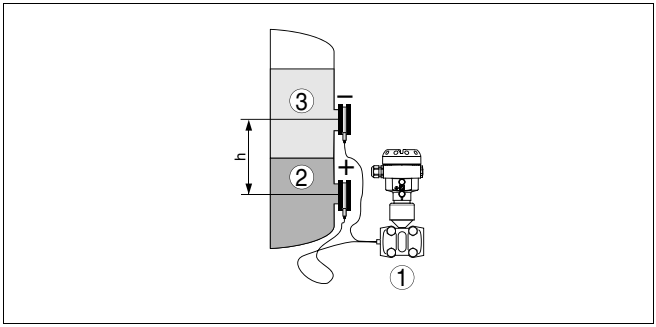


Fig. 6: Interface measurement with DPT10

1 DPT10
2 Liquid with highest density
3 Liquid with lowest density

Functional principle

A metallic measuring cell is used as sensor element. The process pressures are transmitted via separating diaphragms and filling oils to the resistance measuring bridge (semi-conductor technology). The differential-pressure dependent change of the bridge voltage is measured, further processed and converted into a corresponding output signal.

The configuration of the measuring cells differs depending on the measuring range:

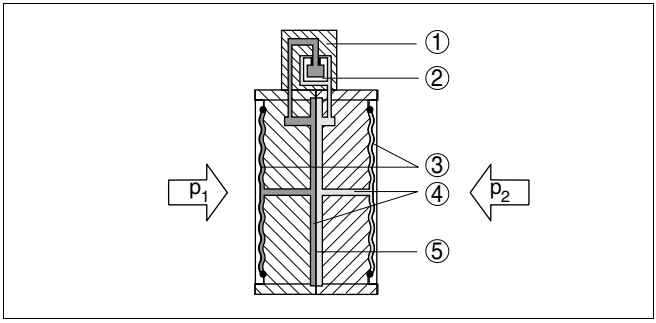


Fig. 7: Metallic measuring cell 10 mbar and 30 mbar - p_1 and p_2 process pressures

1 Measuring element
2 Silicone diaphragm
3 Separating diaphragm
4 Filling oil
5 Integrated overvoltage arrester

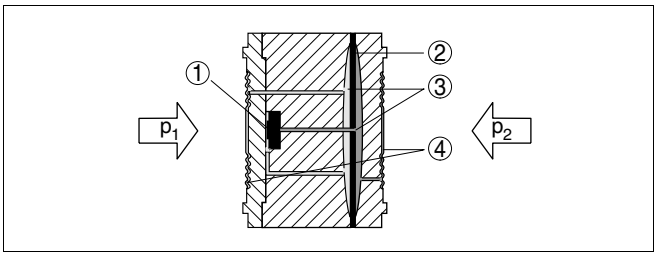


Fig. 8: Metallic measuring cell from 100 mbar - p_1 and p_2 process pressures

1 Measuring element
2 Overload diaphragm/Middle diaphragm
3 Filling oil
4 Separating diaphragm

Voltage supply

Two-wire electronics 4 … 20 mA/HART for power supply and measured value transmission over the same cable.

The supply voltage range can differ depending on the instrument version. The exact range is stated in chapter "*Technical data*".

The background lighting of the indicating and adjustment module is powered by the sensor. A certain level of operating voltage is required for this. You can find the exact voltage specifications in chapter "*Technical data*".

3.3 Operation

DPT10 can be adjusted with different adjustment media:

- with indicating and adjustment module
- the suitable WIKA DTM in conjunction with an adjustment software according to the FDT/DTM standard, e.g. PACTware and PC
- with manufacturer-specific adjustment programs AMS™ or PDM
- With a HART handheld

The entered parameters are generally saved in DPT10, optionally also in the indicating and adjustment module or in PACTware.

3.4 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test according to DIN EN 24180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Caution:
Instruments for oxygen applications are sealed in PE foil and provided with a label "Oxygen! Use no Oil". Remove this foil just before mounting the instrument! See instruction under "*Mounting*".

Transport

Transport must be carried out under consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 … 85 %

4 Mounting

4.1 General instructions

Suitability for the process conditions

Make sure that all parts of the instrument exposed to the process, in particular the sensor element, process seal and process fitting, are suitable for the existing process conditions. These include above all the process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "*Technical data*" or on the type label.

Moisture

Use the recommended cables (see chapter "*Connecting to power supply*") and tighten the cable gland.

You can give your DPT10 additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

Ventilation

The ventilation for the electronics housing is realised via a filter element in the vicinity of the cable glands.

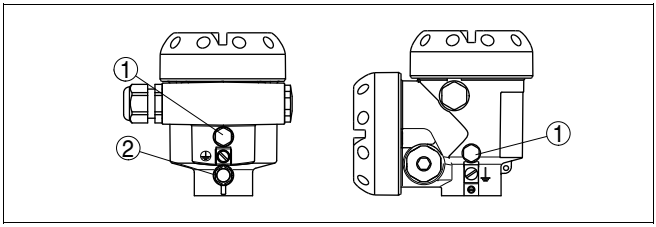


Fig. 9: Position of the filter element with single and double chamber housing

1 Filter element for ventilation of the electronics housing
2 Blind stopper

Information:
Make sure that the filter element is always free of buildup during operation. A high-pressure cleaner must not be used for cleaning.

Effective pressure lines

You find general recommendations for wiring of effective pressure lines in DIN 19210 "Effective pressure lines for flow systems" or the corresponding national or international standards. When wiring effective pressure lines outdoors, keep in mind to use a suitable antifreeze, e.g. by using tube heat tracing. Wire effective pressure lines with a monotonic decrease of at least 10 %.

Vibrations

In case of strong vibrations at the application position, the instrument version with external electronics should be used.

Temperature limits

Higher process temperatures often mean also higher ambient temperatures for electronics and connection cable. Make sure that the upper temperature limits stated in chapter "*Technical data*" for the environment of the electronics housing and connection cable are not exceeded.

4.2 Special application conditions

Oxygen applications

Oxygen and other gases can be explosive with oils, grease and plastics so that the following provisions must also be taken:

- All components of the plant, such as e.g. measuring instruments must be cleaning according to the requirements of BAM (DIN 19247)
- Depending on the materials used, a certain max. temperature and pressure must not be exceeded in oxygen applications

Danger:
Instruments for oxygen applications must be unpacked just before mounting. After removing the protective cover of the process fitting, the label "O_2" will be visible on the process fitting. Penetration of oil, grease and dirt should be avoided. Danger of explosion!

Pure gas applications

We also offer oil and grease free instruments for special applications such as e.g. ultra-pure gas. There are no special restrictions with respect to the process conditions.

4.3 Measurement setup flow

In gases

→ Mount DPT10 above the measurement loop so that condensate can drain off in the process cable.

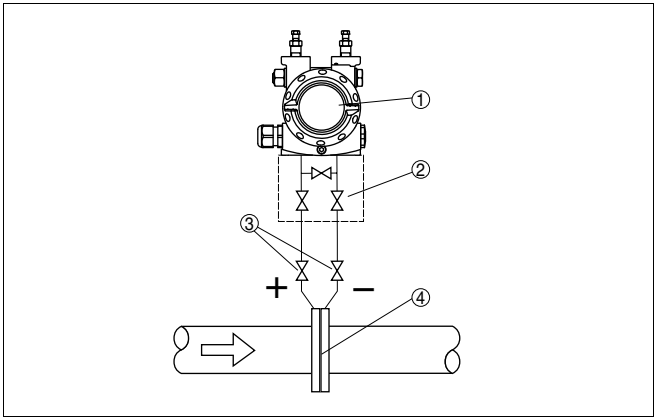


Fig. 10: Measurement setup, flow measurement in gases

1 DPT10
2 3-fold valve block
3 Blocking valves
4 Orifice or impact pressure probe

In vapours

→ Mount DPT10 below the measurement loop

→ Mount condensate vessels at the same height with the discharge socket and at the same distance to DPT10

→ For measurements in products with solid content such as e.g. dirty liquids, the installation of separators and drain valves is recommended to enable collection and removal of debris and sediment.

→ Fill the effective pressure lines to the height of the condensate vessels before setup

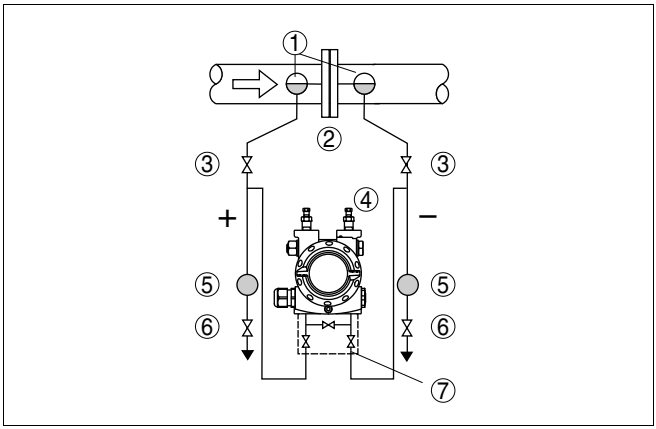


Fig. 11: Measurement setup, flow measurement in vapours

1 Condensate vessels
2 Orifice or impact pressure probe
3 Blocking valves
4 DPT10
5 Precipitator
6 Drain valves
7 3-fold valve block

In liquids

→ Mount DPT10 below the measurement loop so that the effective pressure lines are always filled with liquid and gas bubbles can bubble up to the process line

→ For measurements in products with solid content such as e.g. dirty liquids, the installation of separators and drain valves is recommended to enable collection and removal of debris and sediment.

→ Fill the effective pressure lines to the height of the condensate vessels before setup

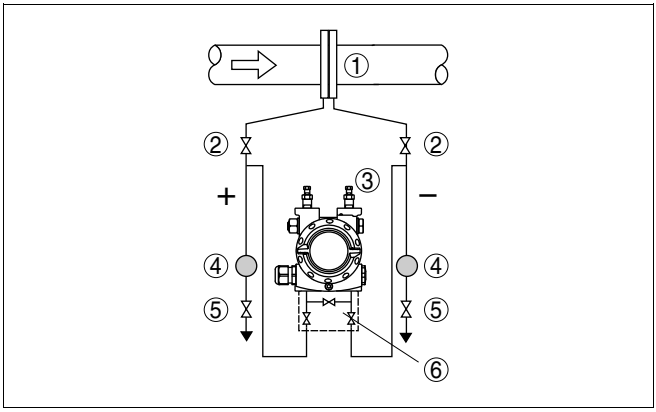


Fig. 12: Measurement setup, flow measurement in liquids

1 Orifice or impact pressure probe
2 Blocking valves
3 DPT10
4 Precipitator
5 Drain valves
6 3-fold valve block

4.4 Measurement setup level

In open vessels with effective pressure line

→ Mount DPT10 below the lower measurement connection so that the effective pressure lines are always filled with liquid

→ Minus side is open to the atmospheric pressure

→ For measurements in products with solid content such as e.g. dirty liquids, the installation of separators and drain valves is recommended to enable collection and removal of debris and sediment.

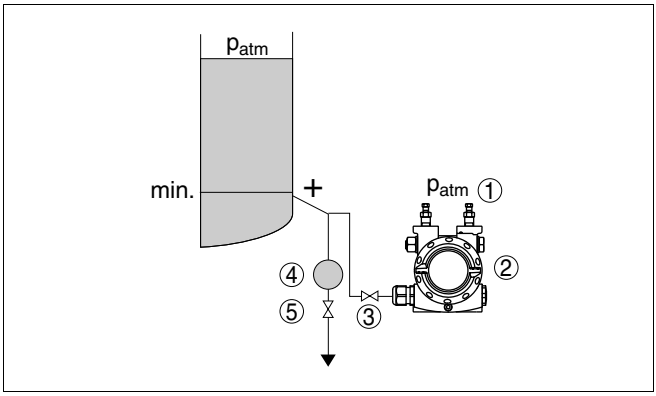


Fig. 13: Measurement setup, level measurement in the open vessel

1 DPT10
2 Minus side is open to the atmospheric pressure
3 Blocking valve
4 Precipitator
5 Drain valve

In open vessels with unilateral pressure transmitter

→ Mount DPT10 directly to the vessel

→ Minus side is open to the atmospheric pressure

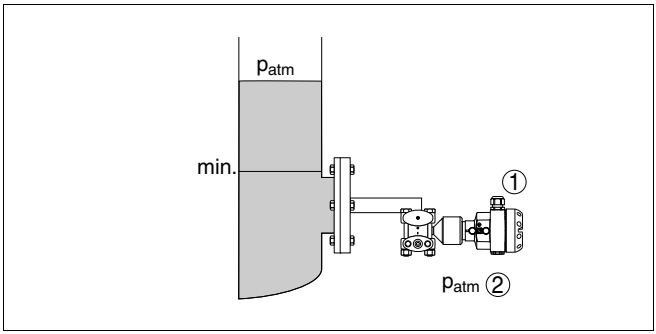


Fig. 14: Measurement setup, level measurement in the open vessel

1 DPT10
2 Minus side is open to the atmospheric pressure

In closed vessels with effective pressure lines

→ Mount DPT10 below the lower measurement connection so that the effective pressure lines are always filled with liquid

→ Connect minus side always above the max. level

→ For measurements in products with solid content such as e.g. dirty liquids, the installation of separators and drain valves is recommended to enable collection and removal of debris and sediment.

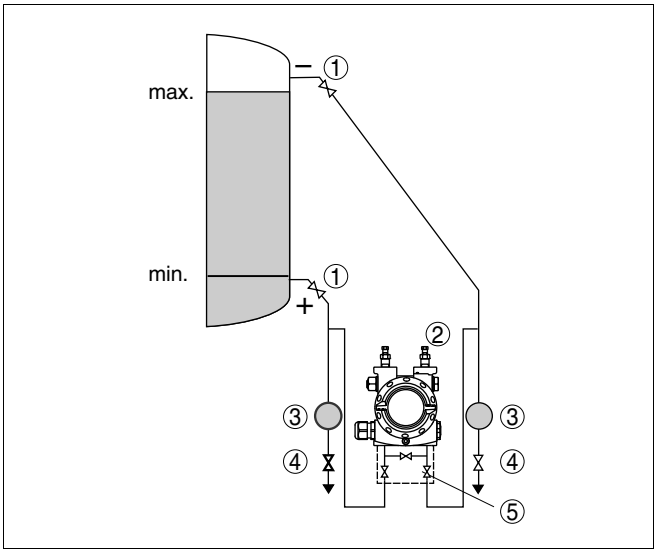


Fig. 15: Measurement setup, level measurement in closed vessel

1 Blocking valves
2 DPT10
3 Precipitator
4 Drain valves
5 3-fold valve block

In closed vessels with unilateral pressure transmitter

→ Mount DPT10 directly to the vessel

→ Connect minus side always above the max. level

→ For measurements in products with solid content such as e.g. dirty liquids, the installation of separators and drain valves is recommended to enable collection and removal of debris and sediment.

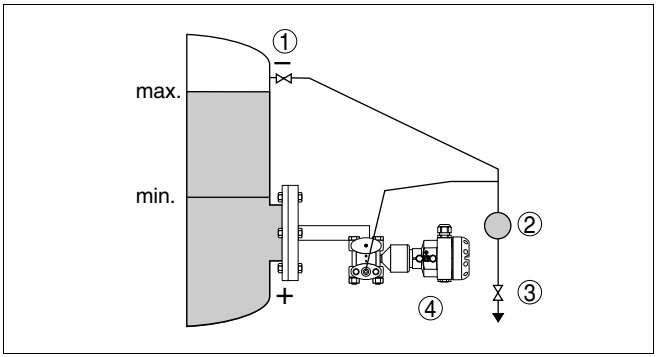


Fig. 16: Measurement setup, level measurement in closed vessel

1 Blocking valve
2 Precipitator
3 Drain valve
4 DPT10

In closed vessels with bilateral pressure transmitter

→ Mount DPT10 below the lower isolating diaphragm

→ The ambient temperature should be the same for both capillaries

Information:
Level measurement is only ensured between the upper edge of the lower and the lower edge of the upper pressure transmitter.

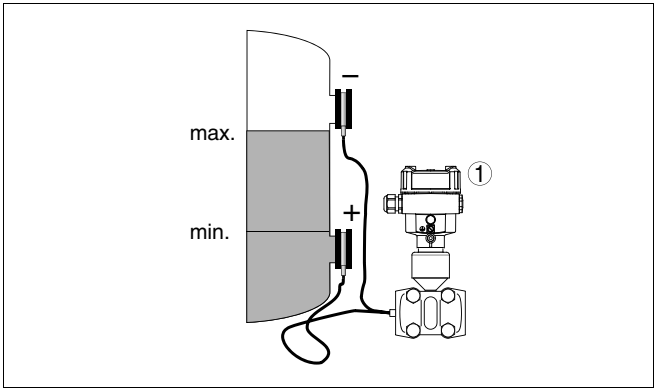


Fig. 17: Measurement setup, level measurement in closed vessel

1 DPT10

In closed vessels with steam layering with effective pressure line

→ Mount DPT10 below the lower measurement connection so that the effective pressure lines are always filled with liquid

→ Connect minus side always above the max. level

→ The condensate vessel ensures a constant pressure on the minus side

→ For measurements in products with solid content such as e.g. dirty liquids, the installation of separators and drain valves is recommended to enable collection and removal of debris and sediment.

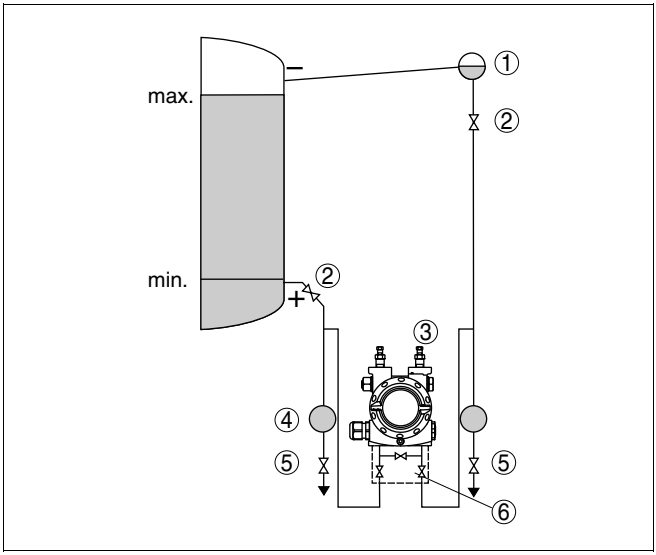


Fig. 18: Measurement setup in closed vessel with superimposed steam

1 Condensate vessel
2 Blocking valves
3 DPT10
4 Precipitator
5 Drain valves
6 3-fold valve block

In closed vessels with steam layering with unilateral pressure transmitter

→ Mount DPT10 directly to the vessel

→ Connect minus side always above the max. level

→ The condensate vessel ensures a constant pressure on the minus side

→ For measurements in products with solid content such as e.g. dirty liquids, the installation of separators and drain valves is recommended to enable collection and removal of debris and sediment.

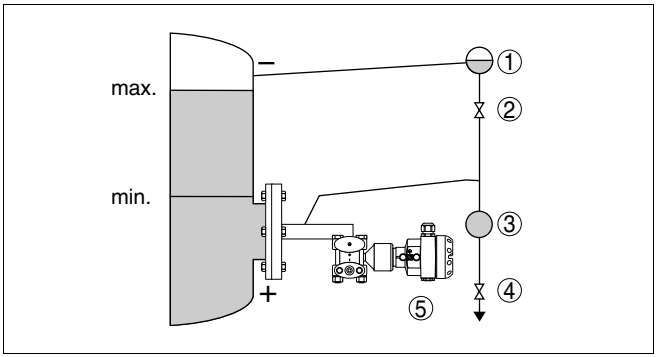


Fig. 19: Measurement setup in closed vessel with superimposed steam

1 Condensate vessel
2 Blocking valve
3 Precipitator
4 Drain valve
5 DPT10

4.5 Measurement setup density and interface

Density and interface measurement are carried out in level measurement mode.

Density measurement

→ Mount DPT10 below the lower isolating diaphragm

→ The ambient temperature should be the same for both capillaries

Information:
The density measurement is only ensured at a level above the upper measuring point. Homogeneous density allocation is a prerequisite.

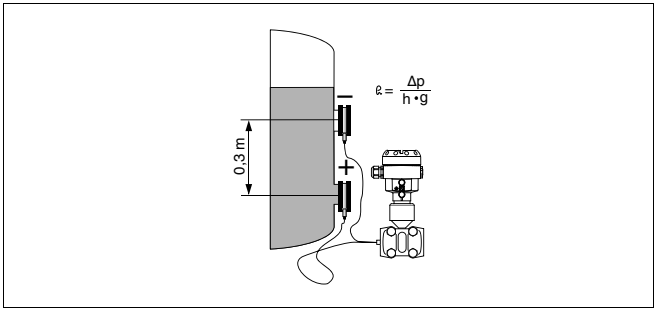


Fig. 20: Measurement setup with density measurement. Density 1 and h = 0.3 m means Δp = 29.4 mbar. With density change: e.g. measured Δp = 35.3 mbar corresponds to density 1.2, measured Δp = 23.5 mbar corresponds to density 0.8

Interface measurement

→ Mount DPT10 below the lower isolating diaphragm

→ The ambient temperature should be the same for both capillaries

Information:
An interface measurement is only possible if the densities of the two media remain the same and the interface is between the two measurement points. The total level must be above the upper measurement point.

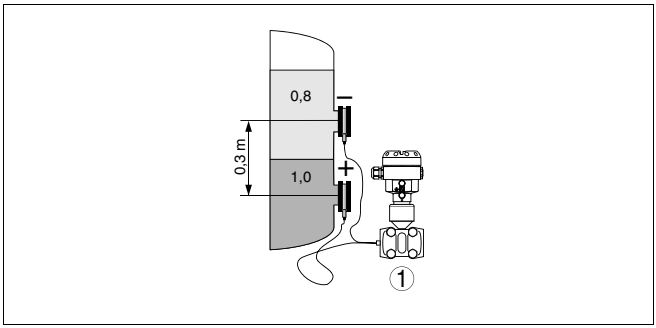


Fig. 21: Measurement setup with interface measurement. Min. adjustment with filling complete with density 0.8 (Δp = 23.5 mbar), max. adjustment with filling complete with density 1.0 (Δp = 29.4 mbar)

4.6 Measurement setup differential pressure

In gases and vapours

→ Mount DPT10 above the measurement loop so that condensate can drain off in the process cable.

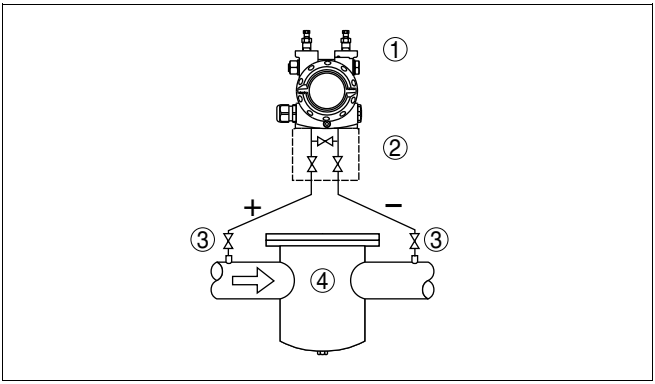


Fig. 22: Measurement setup, differential pressure measurement in gases and vapours

1 DPT10
2 3-fold valve block
3 Blocking valves
4 E.g. filter

In liquids

→ Mount DPT10 below the measurement loop so that the effective pressure lines are always filled with liquid and gas bubbles can bubble up to the process line

→ For measurements in products with solid content such as e.g. dirty liquids, the installation of separators and drain valves is recommended to enable collection and removal of debris and sediment.

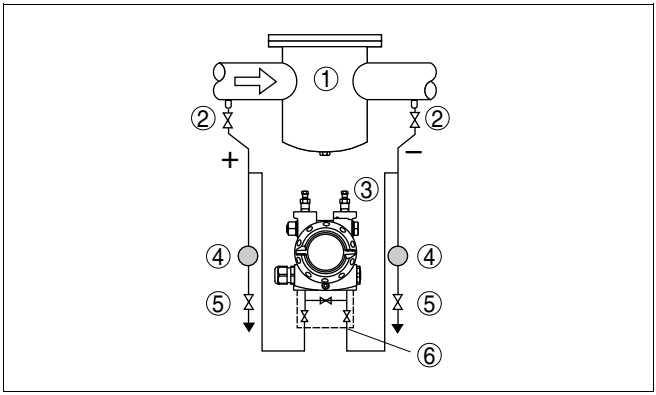


Fig. 23: Measurement setup, flow measurement in liquids

1 E.g. filter
2 Blocking valves
3 DPT10
4 Precipitator
5 Drain valves
6 3-fold valve block

In gases, vapours and liquids

→ Mount isolating diaphragm with capillaries on top or laterally on the pipeline

→ In vacuum applications: Mount DPT10 below the measurement loop

→ The ambient temperature should be the same for both capillaries

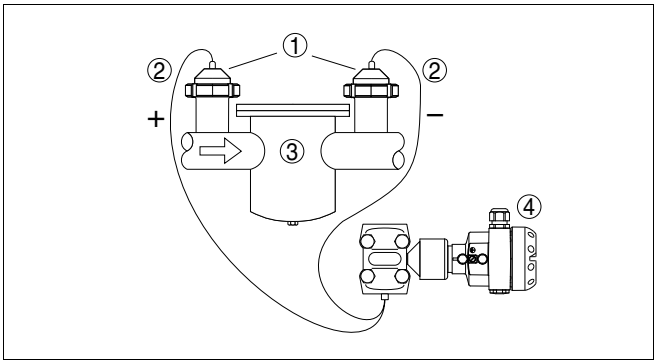


Fig. 24: Measurement setup, differential pressure measurement in gases, vapours and liquids

1 Isolating diaphragm with bolting
2 Capillaries
3 E.g. filter
4 DPT10

4.7 Mounting arrangement and connection valve block

Mounting arrangement

The following illustration shows the elements for a tube mounting and an example for a mounting arrangement with valve block.

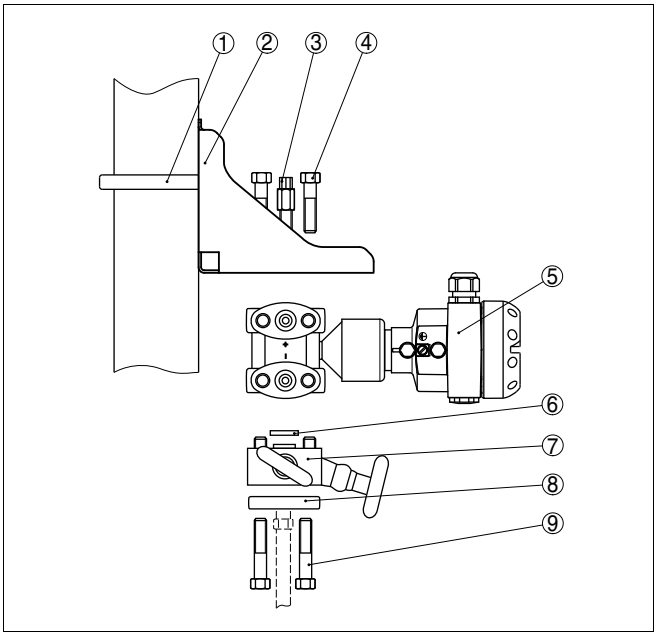


Fig. 25: Mounting arrangement with tube mounting

1 Strap for tube mounting
2 Mounting bracket
3 Ventilation valve
4 Fixing screws
5 DPT10
6 PTFE seal
7 3-fold valve block
8 Oval flange adapter
9 Fixing screws

Connection valve block The following illustration shows the connection of a 5-fold valve block.

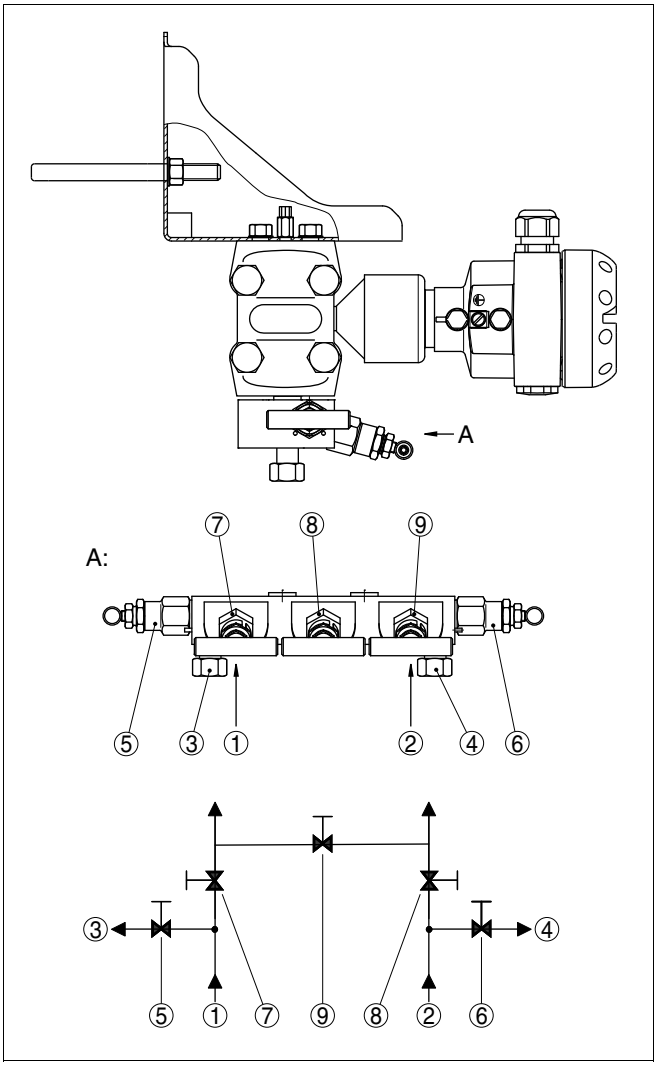


Fig. 26: Connection of a 5-fold valve block

1 Process
2 Process
3 Purging
4 Purging
5 DPT10
6 PTFE seal
7 5-fold valve block

8 Oval flange adapter
9 Fixing screws

4.8 External housing

Wall mounting

1 Mark the holes according to the following drilling template
2 Depending on the mounting surface, fasten the wall mounting plate with 4 screws

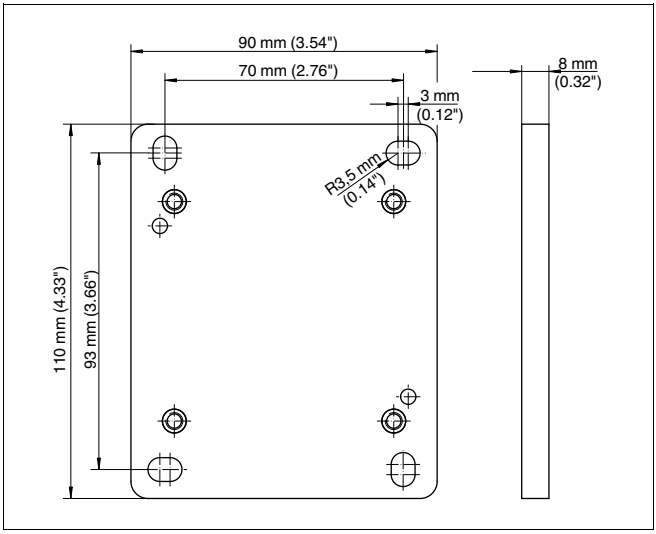


Fig. 27: Drilling template - wall mounting plate

Mount the wall mounting plate so that the cable entry of the socket housing points downward. The socket housing can be displaced by 180° to the wall mounting plate.

4.9 Mounting control

Check the following after mounting the instrument:

- Did you tighten all screws?
- Closing screws and ventilation valves closed

5 Connecting to power supply

5.1 Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage
- If overvoltage surges are expected, overvoltage arresters should be installed

Take note of safety instructions for Ex applications

In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units.

Select power supply

Power supply and current signal are transmitted via the same two-wire connection cable. The supply voltage range can differ depending on the instrument version. The exact range is stated in the "*Technical data*" in the "*Supplement*".

Provide a reliable separation between the supply circuit and the mains circuits according to DIN VDE 0106 part 101.

Keep in mind the following additional influences on the operating voltage:

- Output voltage of the power supply unit can be lower under nominal load (with a sensor current of 20.5 mA or 22 mA in case of fault message)
- Influence of additional instruments in the circuit (see load values in chapter "*Technical data*")

Selecting connection cable

The instrument is connected with standard two-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use cable with round cross-section. A cable outer diameter of 5 … 9 mm (0.2 … 0.35 in) ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.

Cable screening and grounding

If screened cable is necessary, connect the cable screen on both ends to ground potential. In the sensor, the screen must be connected directly to the internal ground terminal. The ground terminal on the outside of the housing must be connected to the potential equalisation (low impedance).

If potential equalisation currents are expected, the connection on the processing side must be made via a ceramic capacitor (e. g. 1 nF, 1500 V). The low frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.

Select connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications. In particular, make sure that no potential equalisation currents flow over the cable screen. In case of grounding on both sides this can be achieved by the use of a capacitor or a separate potential equalisation.

5.2 Connection procedure

Single/Double chamber housing

Proceed as follows:

1 Unscrew the housing cover
2 If an indicating and adjustment module is installed, remove it by turning it slightly to the left.
3 Loosen compression nut of the cable entry
4 Remove approx. 10 cm of the cable mantle, strip approx. 1 cm insulation from the individual wires
5 Insert the cable through the cable gland into the sensor
6 Lift the opening levers of the terminals with a screwdriver (see following illustration)
7 Insert the wire ends into the open terminals according to the wiring plan
8 Press down the opening levers of the terminals, you will hear the terminal spring closing
9 Check the hold of the wires in the terminals by lightly pulling on them
10 Connect the screen to the internal ground terminal, connect the outer ground terminal with potential equalisation
11 Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable
12 Screw the housing cover on

The electrical connection is finished.

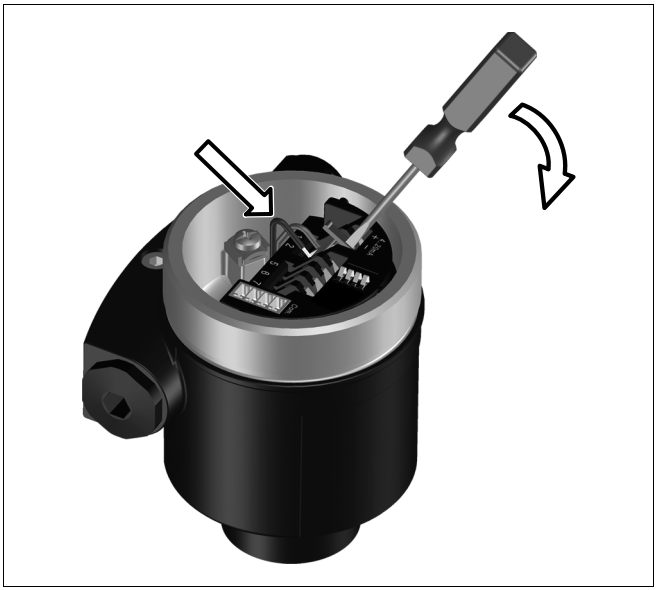


Fig. 28: Connection steps 6 and 7

IP 68 version with external housing

Proceed as follows:

1 Loosen the four screws on the housing base with an Allen key size 4

2 Remove the housing socket from the mounting plate

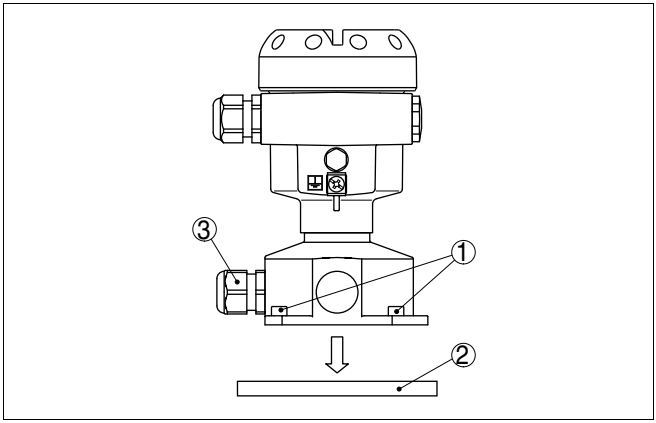


Fig. 29: Components of the external housing

1 Screw
2 Wall mounting plate
3 Cable gland

3 Loop the connection cable through the cable entry on the housing base[1)]

Information:
The cable gland can be mounted in three positions each displaced by 90°. Simply exchange the cable gland against the blind plug in the suitable thread opening.

4 Connect the wire ends as described under "*Single/Double chamber housing*" according to the numbering

5 Connect the screen to the internal ground terminal, connect the outer ground terminal above on the housing to potential equalisation

6 Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable

7 Attach the mounting plate again and tighten the screws

The electrical connection of the sensor to the external housing is hence ready.

[1)] The connection cable is already preconfectioned. If necessary, shorten it to the requested length, cut the breather capillaries clean. Remove approx. 5 cm of the cable mantle, strip approx. 1 cm insulation from the ends of the individual wires. After shortening the cable, fasten the type plate with support back onto the cable.

5.3 Single chamber housing

The following illustrations apply to the non-Ex as well as to the Ex-ia version.

Electronics and connection compartment

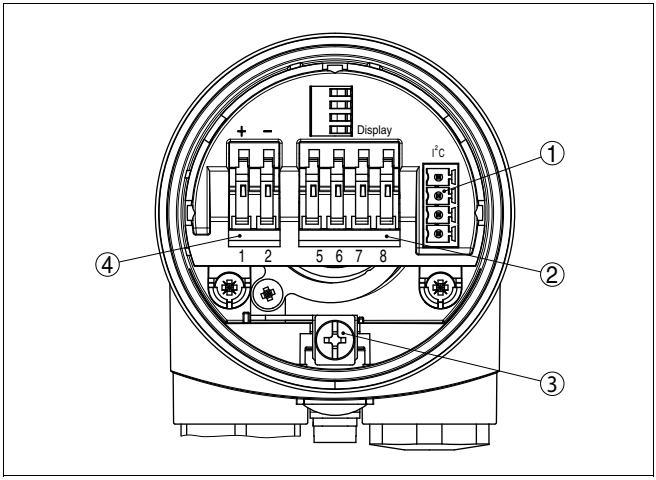


Fig. 30: Electronics and connection compartment with single chamber housing

1 Plug connector for service
2 Spring-loaded terminals for connection of the external indicating and adjustment module
3 Ground terminal for connection of the cable screen
4 Spring-loaded terminals for voltage supply

Wiring plan

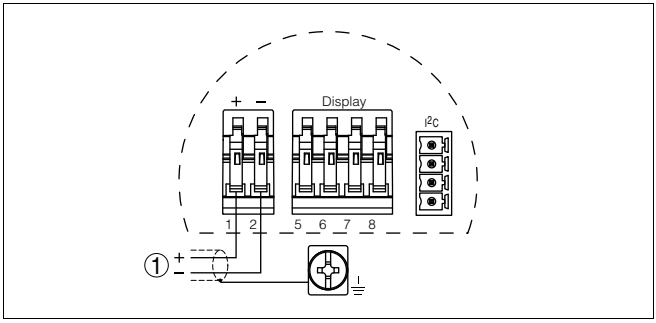


Fig. 31: Wiring plan, single chamber housing

1 Voltage supply/Signal output

5.4 Double chamber housing

The following illustration apply to non-Ex as well as Ex ia versions. The Exd version is described in the next subchapter.

Electronics compartment

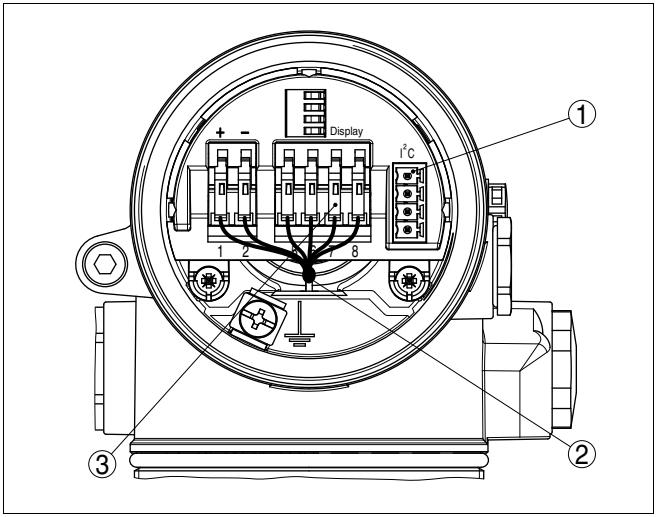


Fig. 32: Electronics compartment, double chamber housing

1 Plug connector for service
2 Internal connection cable to the connection compartment
3 Terminals for the external indicating and adjustment module

Connection compartment

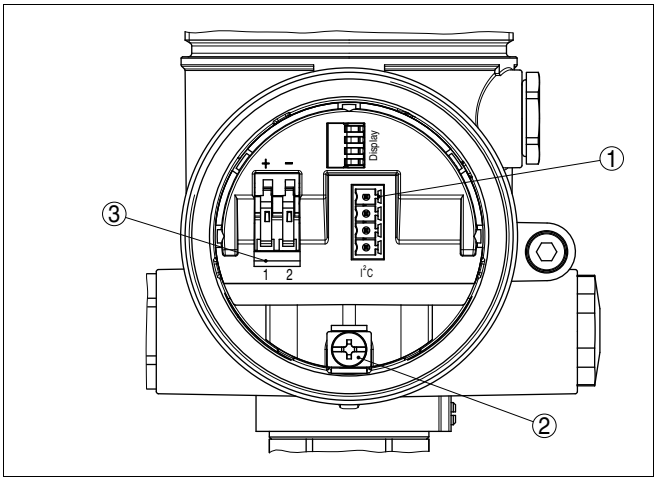


Fig. 33: Connection compartment double chamber housing

1 Plug connector for service
2 Ground terminal for connection of the cable screen
3 Spring-loaded terminals for voltage supply

Wiring plan

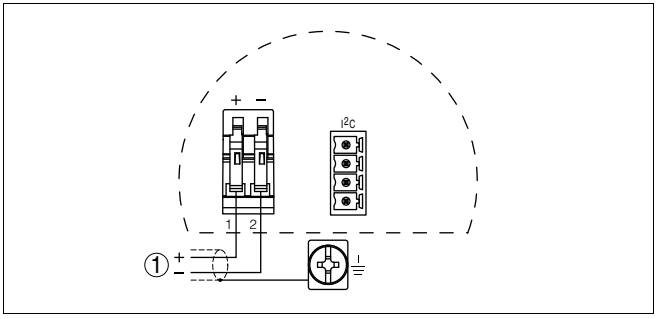


Fig. 34: Wiring plan with double chamber housing

1 Voltage supply/Signal output

5.5 Double chamber housing Ex d

Electronics compartment

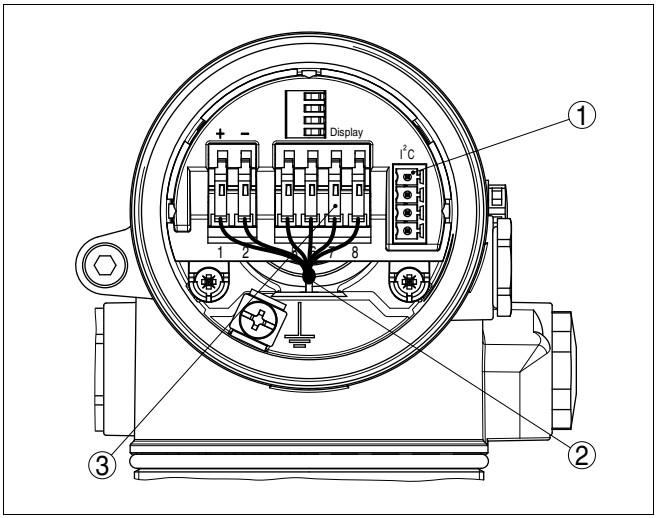


Fig. 35: Electronics compartment, double chamber housing

1 Plug connector for service
2 Internal connection cable to the connection compartment
3 Terminals for the external indicating and adjustment module

Connection compartment

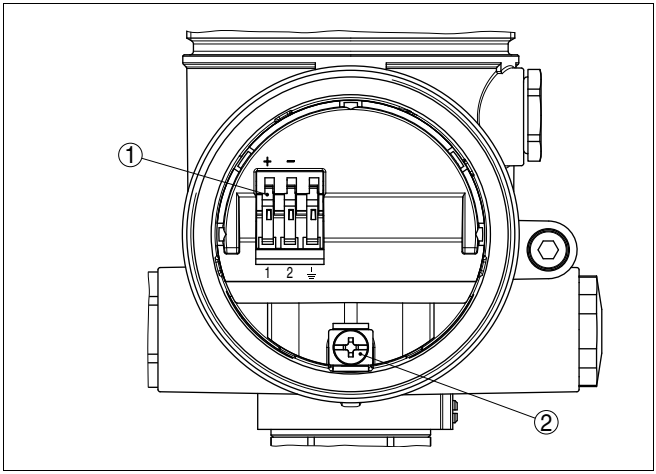


Fig. 36: Connection compartment double chamber housing Ex d

1 Spring-loaded terminals for power supply and cable screen
2 Ground terminal for connection of the cable screen

Wiring plan

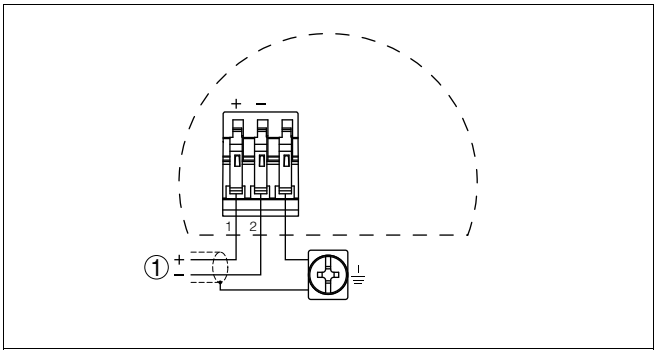


Fig. 37: Wiring plan with double chamber housing Ex d

1 Voltage supply/Signal output

5.6 Version IP 66/IP 68, 1 bar

Wire assignment, connection cable

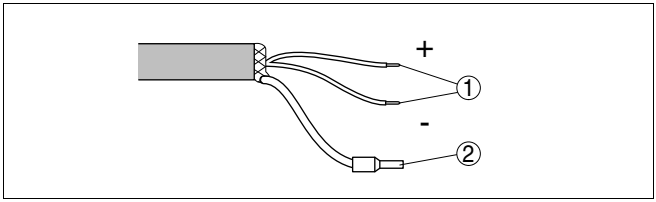


Fig. 38: Wire assignment, connection cable

1 brown (+) and blue (-) to power supply or to the processing system
2 Shielding

5.7 External housing with version IP 68

Electronics and connection compartment for power supply

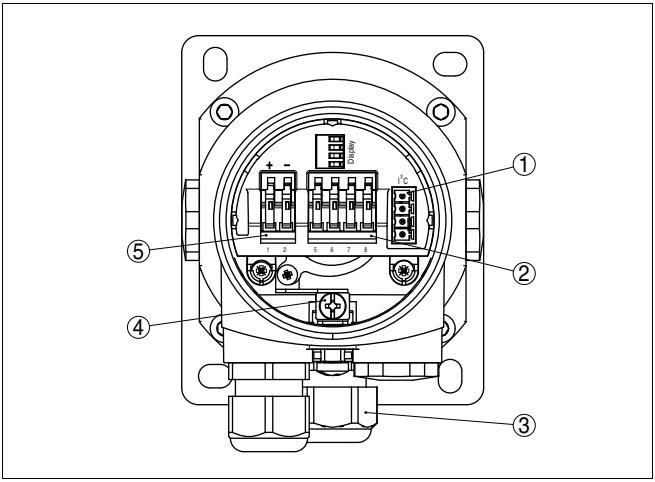


Fig. 39: Electronics and connection compartment

1 Plug connector for service
2 Spring-loaded terminals for connection of the external indicating and adjustment unit
3 Cable gland to the process component
4 Ground terminal for connection of the cable screen
5 Spring-loaded terminals for voltage supply

Terminal compartment for sensor connection

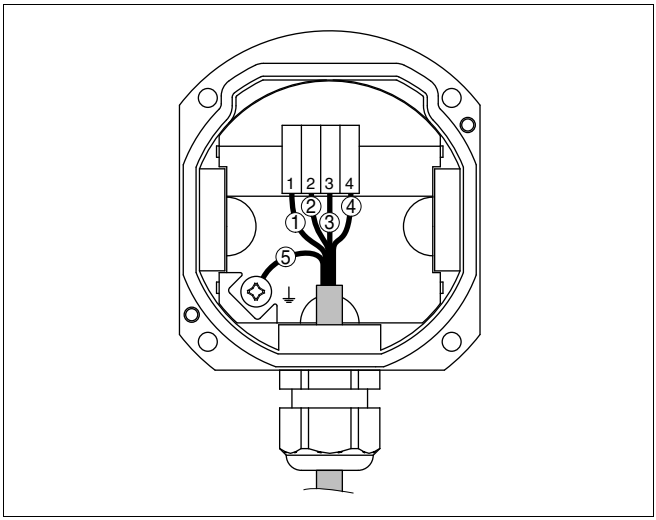


Fig. 40: Connection of the sensor in the housing socket

1 Brown
2 Blue
3 Yellow
4 White
5 Shielding

Wiring plan external electronics

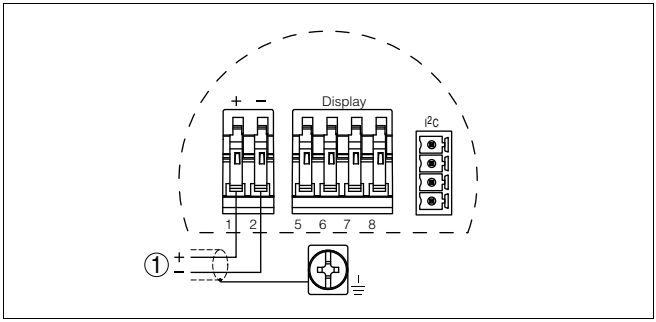


Fig. 41: Wiring plan external electronics

1 Voltage supply

5.8 Switch on phase

Switch on phase

After connecting DPT10 to power supply or after a voltage recurrence, the instrument carries out a self-check for approx. 30 seconds:

- Internal check of the electronics

- Indication of the instrument type, the firmware as well as the sensor TAGs (sensor designation)
- Output signal jumps for approx. 15 seconds to the set fault current

Then the corresponding current is outputted to the cable (the value corresponds to the actual level as well as the settings already carried out, e.g. factory setting).

6 Adjustment with the indicating and adjustment module

6.1 Short description

Function/Configuration

The indicating and adjustment module is used for measured value display, adjustment and diagnosis. It can be mounted in the following housing versions and instruments:

- All sensors of the IPT-1* instrument family, in the single as well as double chamber housing (optionally in the electronics or connection compartment)
- External indicating and adjustment unit

Note:
You can find detailed information on adjustment in the operating instructions manual "*Indicating and adjustment module*".

6.2 Insert indicating and adjustment module

Mount/Dismount indicating and adjustment module

The indicating and adjustment module can be inserted and removed at any time. It is not necessary to interrupt the voltage supply.

For installation, proceed as follows:

1 Unscrew the housing cover
2 Place the indicating and adjustment module in the desired position on the electronics (you can choose any one of four different positions - each displaced by 90°)
3 Press the indicating and adjustment module onto the electronics and turn it to the right until it snaps in.
4 Screw housing cover with inspection window tightly back on

Removal is carried out in reverse order.

The indicating and adjustment module is powered by the sensor, an additional connection is not necessary.

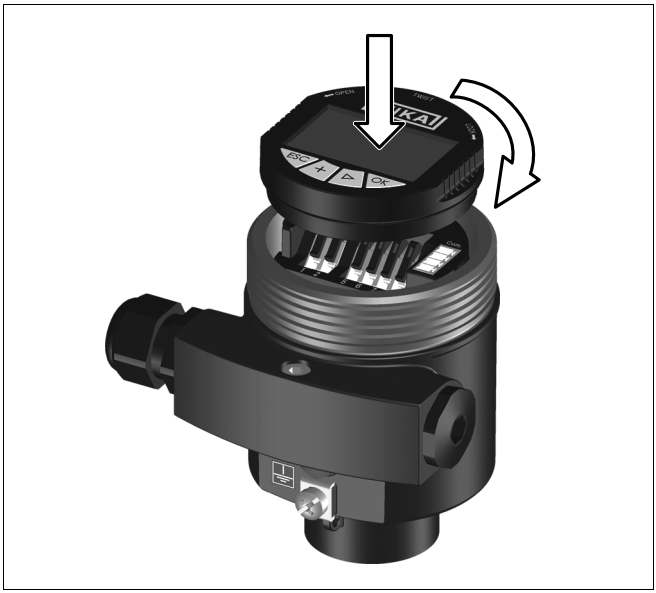


Fig. 42: Insert indicating and adjustment module

Note:
If you intend to retrofit the instrument with an indicating and adjustment module for continuous measured value indication, a higher cover with an inspection glass is required.

6.3 Adjustment system

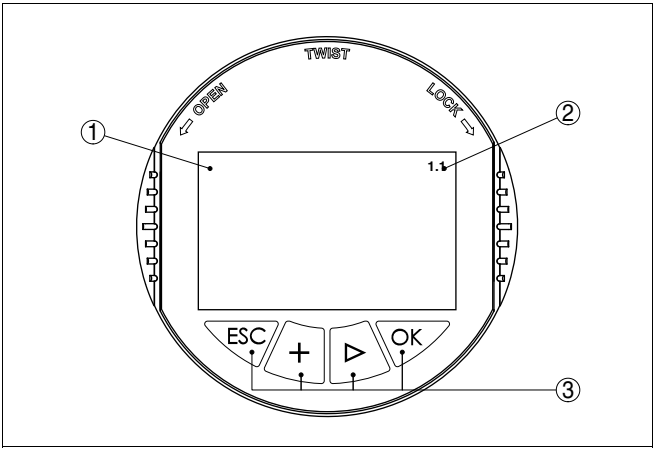


Fig. 43: Indicating and adjustment elements

1 LC display
2 Indication of the menu item number
3 Adjustment keys

Key functions

- ***[OK]*** key:
  - Move to the menu overview
  - Confirm selected menu
  - Edit parameter
  - Save value
- ***[->]*** key to select:
  - menu change
  - list entry
  - Select editing position
- ***[+]*** key:
  - Change value of the parameter
- ***[ESC]*** key:
  - interrupt input
  - jump to the next higher menu

Adjustment system

The sensor is adjusted via the four keys of the indicating and adjustment module. The LC display indicates the individual menu items. The functions of the individual keys are shown in the above illustration. Approx. 10 minutes after the last pressing of a key, an automatic reset to measured value indication is triggered. Any values not confirmed with ***[OK]*** will not be saved.

6.4 Set parameters

Introduction

DPT10 has general adjustment parameters which are also used for other measuring principles as well as instrument-specific adjustment parameters. The general adjustment parameters are described in the operating instructions manual "*Indicating and adjustment module*".

The instrument-specific adjustment parameters are described in this chapter.

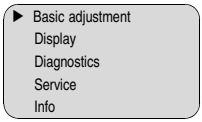
Information:
If the adjustment limits of the adjustment parameters are exceeded, the message "*Outside parameter limits*" appears. The editing procedure can be aborted with ***[ESC]*** or the displayed limit value can be accepted with ***[OK]***.

Application

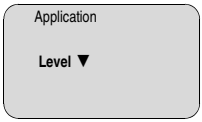
DPT10 can be used for differential pressure, level as well as flow measurement. The delivery status is level measurement. The selection is made in the menu item "*Application*". Depending on the selected application, the adjustment is carried out as zero/span or min./max. adjustment.

Proceed as follows to switch over to the application differential pressure or flow measurement:

1 Push the ***[OK]*** button in the measured value display, the menu overview is displayed.



2 Confirm the menu "*Basic adjustment*" with ***[OK]***.



3 Confirm the menu item "*Application*" with ***[OK]***.

Warning:
Note the warning: "*Output can change*".

4 Select with ***[->]*** "*OK*" and confirm with ***[OK]***.

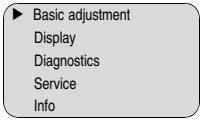
5 Select the requested application in the selection list, for example "*Flow*" and confirm with ***[OK]***.

Unit of measurement

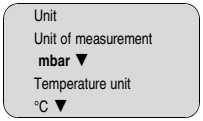
In this menu item you select the adjustment unit as well as the unit for the temperature indication in the display.

To select the adjustment unit (in the example switching over from mbar to bar), proceed as follows:

1 Push the ***[OK]*** button in the measured value display, the menu overview is displayed.



2 Confirm the menu "***Basic adjustment***" with *[OK]*, the menu item "*Unit*" will be displayed.



3 Activate the selection with ***[OK]*** and select "***Units of measurement*** with *[->]*.

4 Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (in the example bar).

5 Confirm with ***[OK]*** and move to position correction with ***[->]***.

The adjustment unit is thus switched over from mbar to bar.

Information:
When switching over to adjustment in a height unit (for example for level measurement), the density also has to be entered.

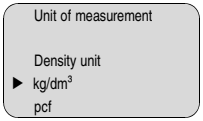
Proceed as follows to enter the density:

1 Push the ***[OK]*** button in the measured value display, the menu overview is displayed.

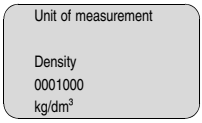
2 Confirm the menu "***Basic adjustment***" with *[OK]*, the menu item "*Units of measurement*" will be displayed.

3 Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (in the example m).

4 Confirm with ***[OK]***, the submenu "*Density unit*" appears.



5 Select the requested unit, e.g. kg/dm³ with ***[->]*** and confirm with ***[OK]***, the submenu "*Density*" appears.



6 Enter the requested density value with ***[->]*** and ***[+]***, confirm with ***[OK]*** and move to position correction with ***[->]***.

The adjustment unit is thus switched over from bar to m.

Proceed as follows to select the temperature unit:

→ Activate the selection with ***[OK]*** and select "***Temperature unit*** with *[->]*.

→ Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (e.g. °F).

→ Confirm with ***[OK]***.

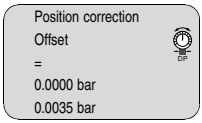
The temperature unit is hence switched over from °C to °F.

Position correction

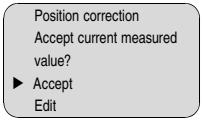
The position correction compensates the influence of the installation position of the instrument on the measured value. In this menu item, the offset value as well as the current measured value are displayed.

Proceed as follows:

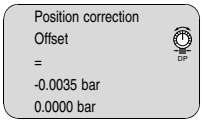
1 Activate in the menu item "*Position correction*" the selection with ***[OK]***.



2 Select with ***[->]***, e.g. to accept the actual measured value 0.0035 bar.



3 Confirm with ***[OK]***.



4 Move to min. (zero) adjustment with ***[->]***.

The current measured value was corrected to 0, the corrective value is available in the display as offset value with sign reversal.

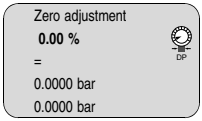
If a known value should be taken over as position correction which is not the current value, then you have to select the function "*Edit*" and enter the requested value.

Zero adjustment with differential pressure

In this menu item, the min. differential pressure is entered.

Proceed as follows:

1 Edit the bar value in the menu item "*zero*" with ***[OK]***.



2 Set the requested value with ***[+]*** and ***[->]***.

3 Confirm with ***[OK]*** and move to span adjustment with ***[->]***.

For an adjustment with pressure, simply enter the actual measured value indicated at the bottom of the display.

The zero adjustment is finished.

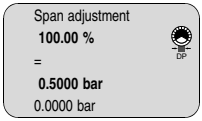
Information:
The zero adjustment shifts the value of the span adjustment. The span, i.e. the difference between these values, however, remains unchanged.

Span adjustment with differential pressure

In this menu item, the max. differential pressure is entered.

Proceed as follows:

1 Edit the bar value in the menu item "*span*" with ***[OK]***.



Information:
When the instrument is not yet adjusted, then the display pressure for 100 % corresponds to the nominal measuring range of the sensor (in the above example 500 mbar).

2 Set the requested value with ***[+]*** and ***[->]***.

3 Confirm with ***[OK]*** and move to the menu overview with ***[ESC]***.

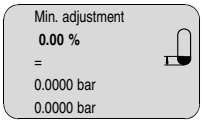
For an adjustment with pressure, simply enter the actual measured value indicated at the bottom of the display.

The span adjustment is finished.

Min. adjustment with level

Proceed as follows:

1 Edit the % value in the menu item "*Min. adjustment*" with ***[OK]***.



2 Set the requested value with ***[+]*** and ***[->]***.

3 Confirm with ***[OK]*** and edit the requested bar value.

4 Set the requested bar value with ***[+]*** and ***[->]***.

5 Confirm with ***[OK]*** and move to max. adjustment with ***[->]***.

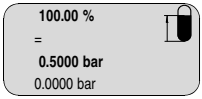
For an adjustment with filling, simply enter the actual measured value indicated at the bottom of the display.

The min. adjustment is finished.

Max. adjustment with level

Proceed as follows:

1 Edit the % value in the menu item "*Max. adjustment*" with ***[OK]***.



Information:
When the instrument is not yet adjusted, then the display pressure for 100 % corresponds to the nominal measuring range of the sensor (in the above example 500 mbar).

2 Set the requested value with ***[->]*** and ***[OK]***.

3 Edit the requested mbar value with ***[OK]***.

4 Set the requested value with ***[+]*** and ***[->]***.

5 Confirm with ***[OK]*** and move to the menu overview with ***[ESC]***.

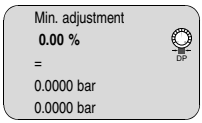
For an adjustment with filling, simply enter the actual measured value indicated at the bottom of the display.

The max. adjustment is finished.

Min. adjustment with flow

Proceed as follows:

1 Edit the bar value in the menu item "*Min. adjustment*" with ***[OK]***.



2 Set the requested bar value with ***[+]*** and ***[->]***.

3 Confirm with ***[+]*** and move to max. adjustment with ***[->]***.

For an adjustment with flow, simply enter the actual measured value indicated at the bottom of the display.

Information:
The DPT10 is also suitable for bidirectional flow measurement (flow in both directions). The selection is carried out in the menu item "*Linearization curve*". With the bidirectional flow measurement, the min. adjustment value must be equal to the negative max. adjustment value.

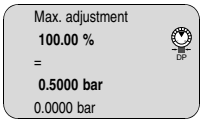
Example: Max. adjustment value **+100 mbar**, as min. adjustment value, **-100 mbar** must hence be entered.

The min. adjustment is finished.

Max. adjustment with flow

Proceed as follows:

1 Edit the bar value in the menu item "*Max. adjustment*" with ***[OK]***.



Information:
When the instrument is not yet adjusted, then the display pressure for 100 % corresponds to the nominal measuring range of the sensor (in the above example 500 mbar).

2 Set the requested mbar value with ***[->]*** and ***[OK]***.

3 Confirm with ***[OK]*** and move to the menu overview with ***[ESC]***.

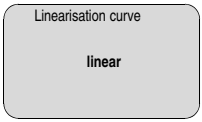
For an adjustment with flow, simply enter the actual measured value indicated at the bottom of the display.

The max. adjustment is finished.

Linearization curve with level

For level measurement, a linearization is necessary for all vessels in which the vessel volume does not increase linearly with the level - e.g. in a cylindrical or spherical tank - and the indication or output of the volume is requested.

Respective linearisation curves are stored for these vessels. They indicate the relation between the percentage level and the vessel volume. By activating the suitable curve, the percentage vessel volume is displayed correctly.



Enter the requested parameter via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Linearization curve with flow

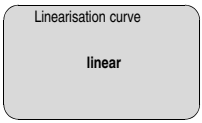
The square of the flow is proportional to the pressure difference at the orifice or the back pressure probe:

$(Q_n)^2 = c \bullet \Delta p$

To provide a linear relation between flow and output variable, an extraction by root is necessary:

$Q_n = \sqrt{(c \bullet \Delta p)}$

The DPT10 has a root extraction function. It is selected in the menu item "*Linearization curve*".



Enter the requested parameter via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Information:
When selecting flow bidirectional, the min. adjustment must be entered with negative sign.

Leak flow volume suppression with flow

In some application, small flow quantities should not be detected. With the creeping quantity suppression, the flow value can be suppressed up to a certain % value. The default value is 5 % of the max. flow value, corresponding to 0.25 % of the max. differential pressure value. The limit value is 50 %. This function depends on the selected linearization function and is only available with root extracted characteristics.

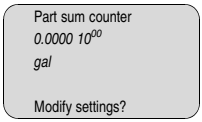
The square root/bidirectional square root characteristics is very steep at the zero point. This means that small changes in the measured differential pressure cause big changes in the output signal. The leak volume suppression stabilises the signal output.

Total amounts counter and subtotalizer with flow

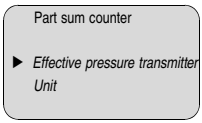
The DPT10 has two internal totalizers. For both you can adjust volume or mass as count function as well as separately the unit.

Proceed as follows:

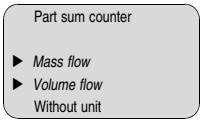
1 Select, for example, menu item "*Part sum counter*".



2 Activate the function "*Modify settings?*" with ***[OK]***.

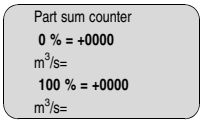


3 Confirm with ***[OK]*** "*Effective pressure transmitter*".



4 Select the requested variable with ***[->]*** and confirm with ***[OK]***.

5 Select calibration unit of the effective pressure transmitter with ***[->]***, for example m^3/s and confirm with ***[OK]***.



6 Edit with ***[OK]*** and set the requested values with ***[+]*** and ***[->]***.

7 Confirm with ***[OK]*** and jump back to the indication of the part sum counter.

8 Select with ***[->]*** the unit of the sum counter, adjust the requested unit with ***[->]***, for example m^3/s and confirm with ***[OK]***.

The setting of the part sum counter is hence terminated, the counting function is activated.

The procedure of the total sum counter is the same.

Copy sensor data

This function enables uploading parameter adjustment data into the Indicating and adjustment module as well as downloading parameter adjustment data into the sensor. A detailed description of the function is available in the operating instructions manual "*Indicating and adjustment module*".

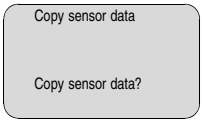
The following data are loaded or downloaded with this function:

- Measured value presentation
- Application
- Adjustment

- Damping
- Linearisation curve
- Leak volume suppression
- Sensor-TAG
- Displayed value
- Display unit
- Scaling
- Current output
- Unit of measurement
- Language

The following safety-relevant data are **not** uploaded or downloaded:

- HART mode
- PIN



Reset

Basic adjustment

The reset "*Basic adjustment*" resets the values of the following menu items to the reset values (see chart):

Menu section	Menu item	Reset value
Basic settings	Unit of measurement	bar
	Temperature unit	°C
	Zero/Min. adjustment	Measuring range begin
	Span/Max. adjustment	Measuring range end
	Density	1 kg/l
	Density unit	kg/l
	Damping	1 s
	Linearisation	linear
	Sensor-TAG	Sensor
Display	Displayed value	Differential pressure
	Display unit	Mass/kg
	Scaling	0.00 to 100.0
	Decimal point indication	8888.8
Diagnostics	Total sum counter	0.0000 10^{00} gal
	Part sum counter	0.0000 10^{00} gal

Menu section	Menu item	Reset value
Service	Current output - characteristics	4 … 20 mA
	Current output - failure mode	< 3.6 mA
	Current output - min. current	3.8 mA
	Current output - max. current	20.5 mA

The values of the following menu items are *not* reset with "**Reset**:

Menu section	Menu item	Reset value
Basic settings	Application	no reset
	Position correction	no reset
Display	Lighting	no reset
Service	Language	no reset
	HART mode	no reset

Pointer
The min. and max. temperature or pressure values are each reset to the actual value.

Totalizer
The total and part sum counter are reset to zero.

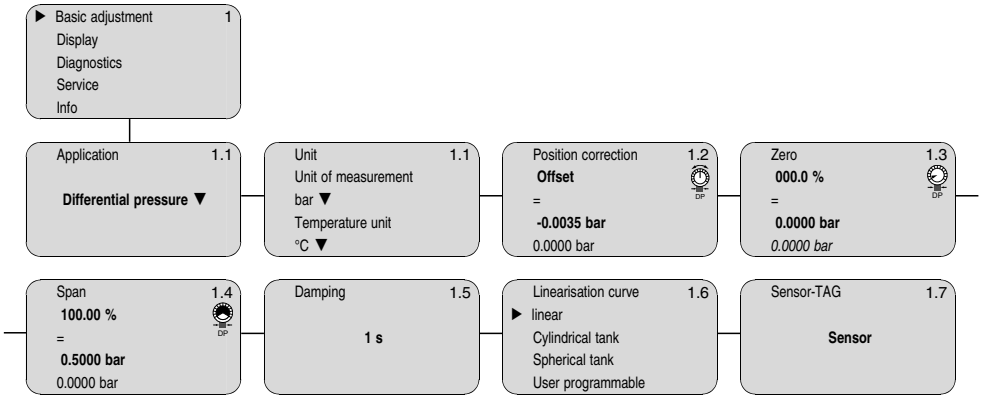
Optional settings

Additional adjustment and diagnosis options such as e.g. scaling, simulation or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual "*Indicating and adjustment module*".

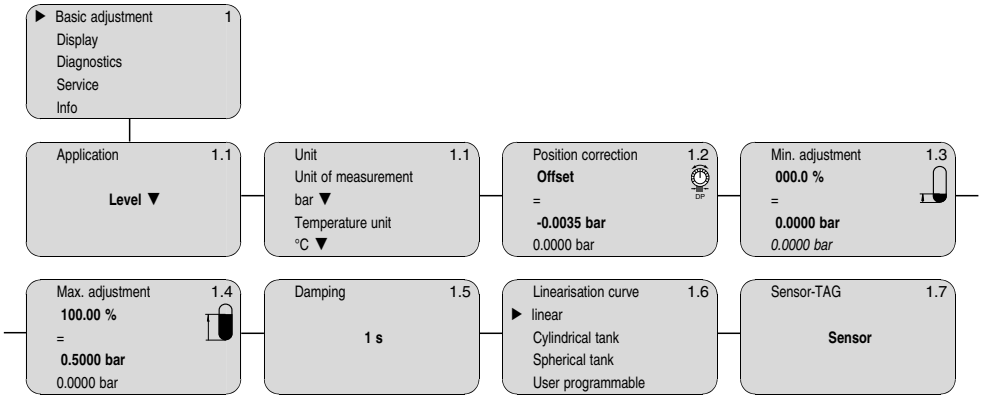
6.5 Menu schematic

Information:
Depending on the version and application, the highlighted menu windows are not always available.

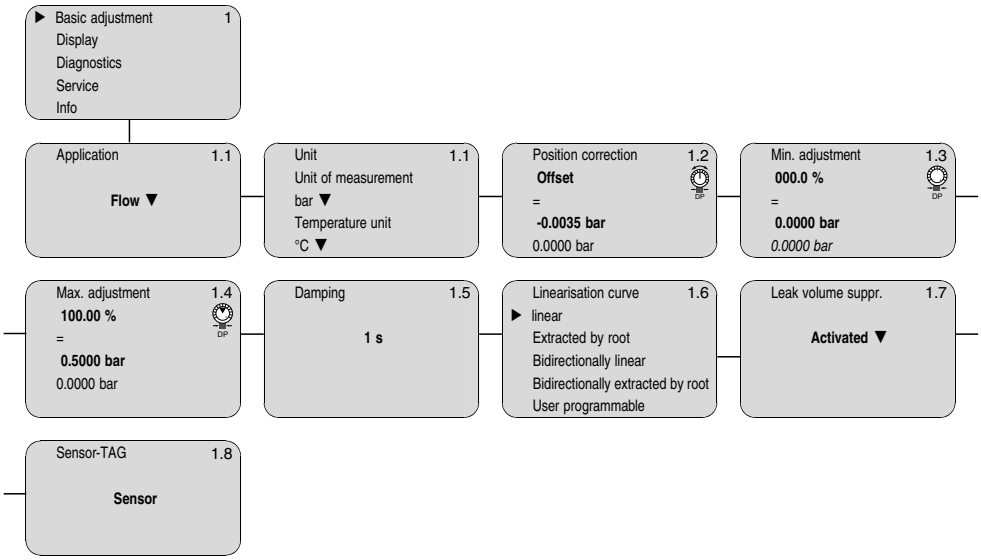
Basic adjustment differential pressure



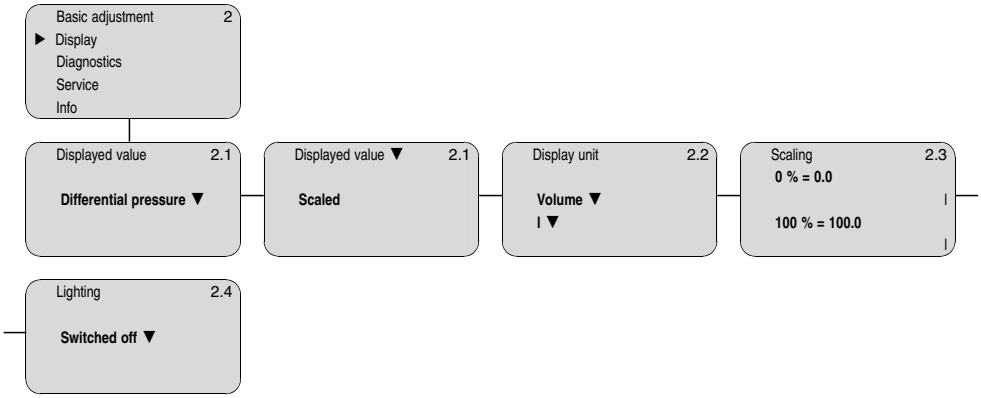
Basic setting level



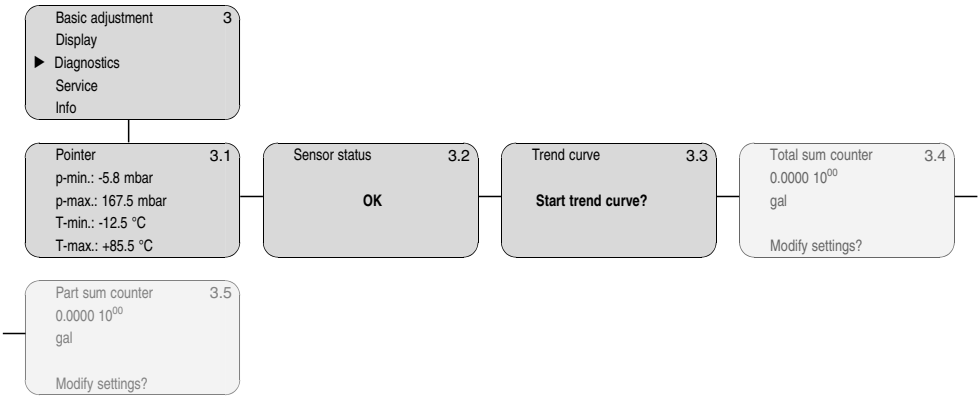
Basic adjustment flow



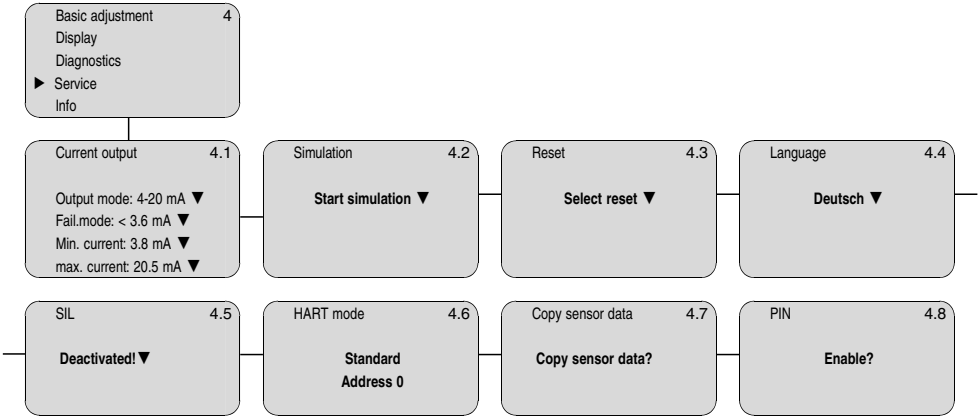
Display



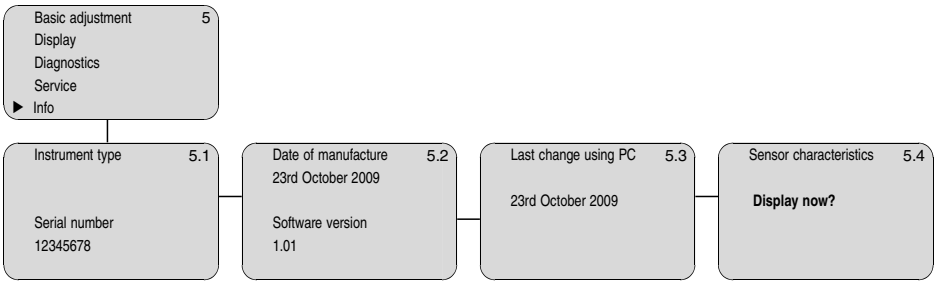
Diagnostics



Service



Info


Basic adjustment 5
Display
Diagnostics
Service
▶ Info
Instrument type 5.1
Serial number
12345678
Date of manufacture 5.2
23rd October 2009
Software version
1.01
Last change using PC 5.3
23rd October 2009
Sensor characteristics 5.4
Display now?

6.6 Saving the parameter adjustment data

It is recommended noting the adjusted data, e.g. in this operating instructions manual and archive them afterwards. They are hence available for multiple use or service purposes.

If DPT10 is equipped with an indicating and adjustment module, the most important data can be read out of the sensor into indicating and adjustment module. The procedure is described in the operating instructions manual "*Indicating and adjustment module*" in the menu item "*Copy sensor data*". The data remain there permanently even if the sensor power supply fails.

If it is necessary to exchange the sensor, the indicating and adjustment module is inserted into the replacement instrument and the data are written into the sensor under the menu item "*Copy sensor data*".

7 Setup with the adjustment program AMS™

7.1 Parameter adjustment with AMS™

For WIKA sensors, instrument descriptions for the adjustment program AMS™ are available as DD. The instrument descriptions are already implemented in the current version of AMS™. For older versions of AMS™, a free-of-charge download is available via Internet.

Go via www.WIKA.com and "*Downloads*" to the item "*Software*".

8 Set up

8.1 Select the mode

The following modes can be adjusted on DPT10:

- Flow measurement
- Level measurement
- Differential pressure measurement

8.2 Flow measurement

Instructions

In flow measurement, normally DPT10 is used without isolating diaphragm.

Before adjusting DPT10, you have to clean the effective pressure lines and the instrument must be filled with the medium.

Installation for gases

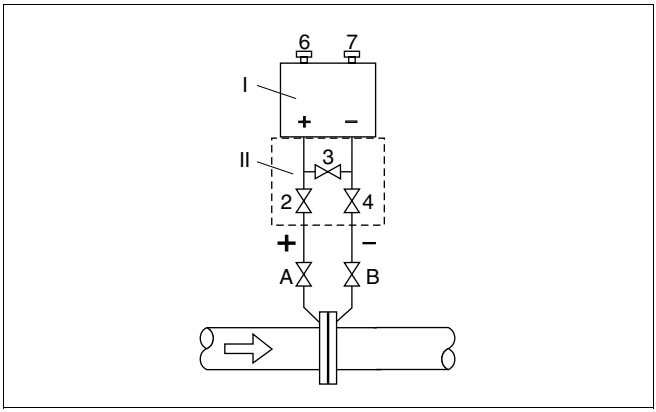


Fig. 44: Preferred installation for gases

I DPT10
II 3-fold valve block
2.4 Inlet valves
3 Breather valve
6.7 Vent valves on DPT10
A, B Blocking valves

Installation for liquids

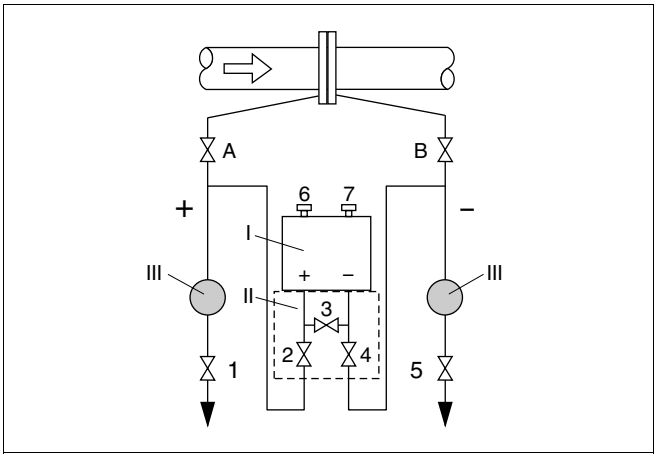


Fig. 45: Preferred installation for liquids

I DPT10
II 3-fold valve block
III Precipitator
1.5 Drain valves
2.4 Inlet valves
3 Breather valve
6.7 Vent valves on DPT10
A, B Blocking valves

Prepare the adjustment

Proceed as follows:

1 Close valve 3

2 Fill measuring system with medium.

Open valves A, B, 2, 4: Medium flows in

If necessary, clean the differential pressure lines: - with gases by blowing out with compressed air - with liquids by rinsing.[2)]

For this purpose close valve 2 and 4, i.e. block the instrument.

Then open valve 1 and 5 so that the effective pressure lines blow out/rinse.

After cleaning, close valves 1 and 5

3 Remove air from instrument:

Open valves 2 and 4: Medium flows in

Close valve 4: Minus side will be closed

Open valve 3: Equalisation plus and minus side

Briefly open valve 6 and 7, then close again: Fill the measuring instrument completely with the medium and remove air

[2)] Arrangement with 5 valves.

4 Carry out a position correction if the following conditions apply. If the conditions are not fulfilled, then carry out the position correction after step 6.

   Conditions:

   The process cannot be sealed off.

   The pressure extraction points (A and B) are at the same geodesic height.

5 Put measurement loop into operation:

   Close valve 3: Separate plus and minus side

   Open valve 4: Connect minus side

   Now:

   Valves 1, 3, 5, 6 and 7 are closed[3)]

   Valves 2 and 4 open

   Valves A and B open (if available)

6 Carry out position correction, if flow can be blocked. In this case, step 5 is deleted.

Then carry out adjustment, see chapter "*Set parameters*".

8.3 Level measurement

Instructions

For level measurements, the DPT10 in all versions is used.

DPT10 with bilateral isolating diaphragm CSB is immediately ready for operation.

The DPT10 without isolating diaphragm or with unilaterial isolating diaphragm CSS is ready for operation after opening a possibly available block valve.

Before you adjust DPT10 without isolating diaphragm or with unilateral isolating diaphragm, the effective pressure lines must be cleaned and the instrument filled with the medium.

3) Valves 1, 3, 5: Configuration with 5 valves.

Installation for open vessels

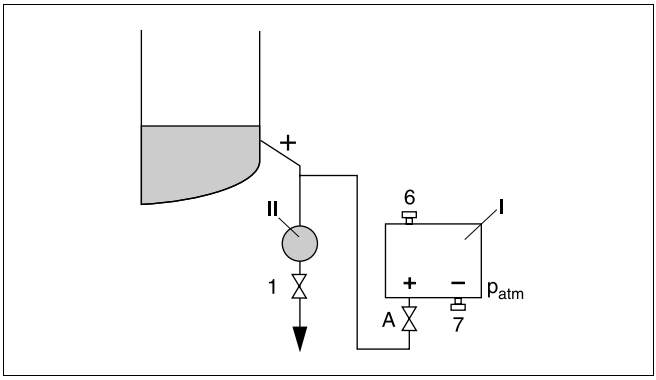


Fig. 46: Preferred installation for open vessels

I DPT10
II Precipitator
1 Drain valve
6.7 Vent valves on DPT10
A Blocking valve

Prepare the adjustment

Proceed as follows:

1 Fill the vessel to just over the lower tap.

2 Fill measuring system with medium.

Open valve A: Medium flows in.

3 Vent instrument

Briefly open valve 6, then close it: Fill the measuring instrument completely with the medium and remove air.

4 Set measurement loop to operation

Now:

Valve A open and valve 6 closed

Then carry out adjustment, see below.

Installation for closed vessels

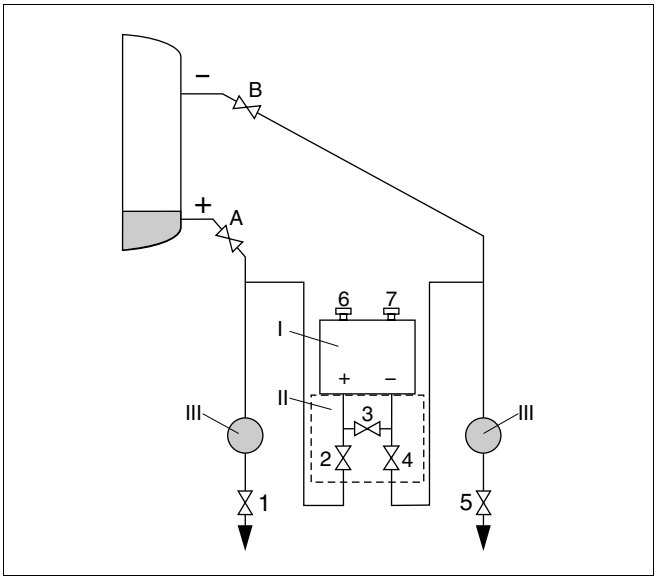


Fig. 47: Preferred installation for closed vessels

I DPT10
II 3-fold valve block
III Precipitator
1, 5 Drain valves
2, 4 Inlet valves
6, 7 Vent valves on DPT10
A, B Blocking valves

Prepare the adjustment

Proceed as follows:

1 Fill the vessel to just above the lower tap

2 Fill measuring system with medium

Close valve 3: Separate plus and minus side

Open valve A and B: Open block valves

3 Vent plus side (probably empty minus side)

Open valve 2 and 4: Discharge medium on the plus side

Briefly open valve 6 and 7, then close again: Fill the plus side completely with the medium and remove air.

4 Set measurement loop to operation

Now:

Valve 3, 6 and 7 are closed

Valves 2, 4, A and B are open

Then carry out adjustment, see below.

Installation for closed vessels with steam layer

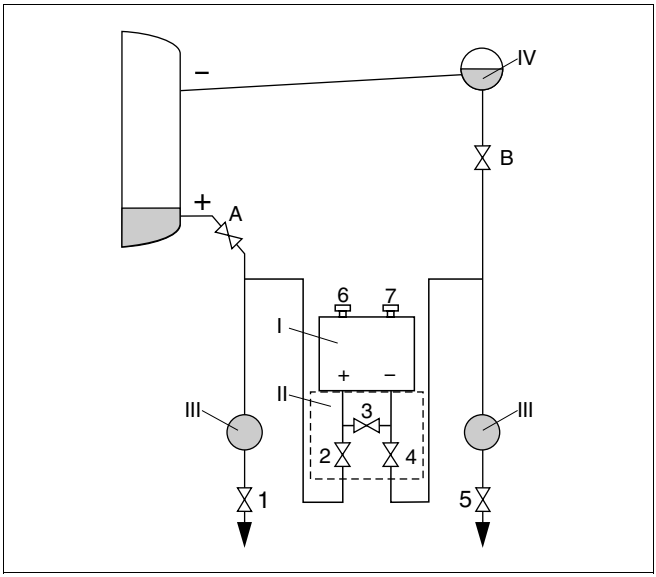


Fig. 48: Preferred installation for closed vessels with steam overlay

I DPT10
II 3-fold valve block
III Precipitator
IV Condensate vessel
1, 5 Drain valves
2, 4 Inlet valves
3 Breather valve
6, 7 Vent valves on DPT10
A, B Blocking valves

Prepare the adjustment

Proceed as follows:

1 Fill the vessel to just above the lower tap

2 Fill measuring system with medium

Open valve A and B: Open block valves

Fill the minus effective pressure line on the height of the condensation pot

3 Remove air from instrument:

Open valve 2 and 4: Discharge medium

Open valve 3: Equalisation plus and minus side

Briefly open valve 6 and 7, then close again: Fill the measuring instrument completely with the medium and remove air

4 Put measurement loop into operation:

Close valve 3: Separate plus and minus side

Open valve 4: Connect minus side

Now:

Valve 3, 6 and 7 are closed

Valves 2, 4, A and B are open.

Then carry out adjustment, see chapter "*Set parameters*".

8.4 Density and interface measurement

For density and interface measurements, DPT10 with bilateral isolating diaphragm CSB is used.

DPT10 in this version is immediately ready for operation.

8.5 Differential pressure measurement

Instructions

For differential pressure measurements, DPT10 without isolating diaphragm or with bilateral isolating diaphragm CSB is used.

DPT10 with bilateral isolating diaphragm CSB is immediately ready for operation.

Before adjusting DPT10 without isolating diaphragm, the effective pressure lines must be cleaned and the instrument filled with medium.

Installation for gases

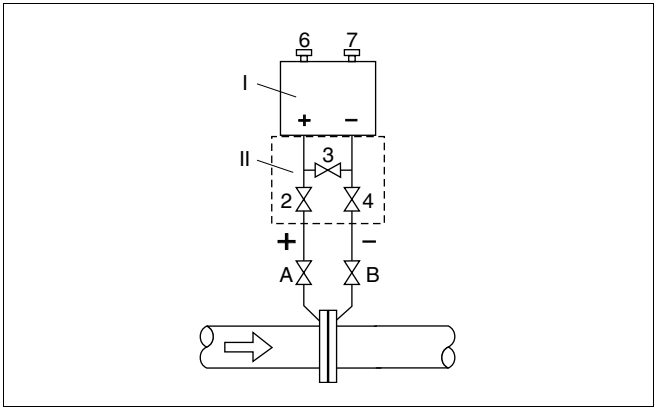


Fig. 49: Preferred installation for gases

I DPT10
II 3-fold valve block
2, 4 Inlet valves
3 Breather valve
6, 7 Vent valves on DPT10
A, B Blocking valves

Installation for liquids

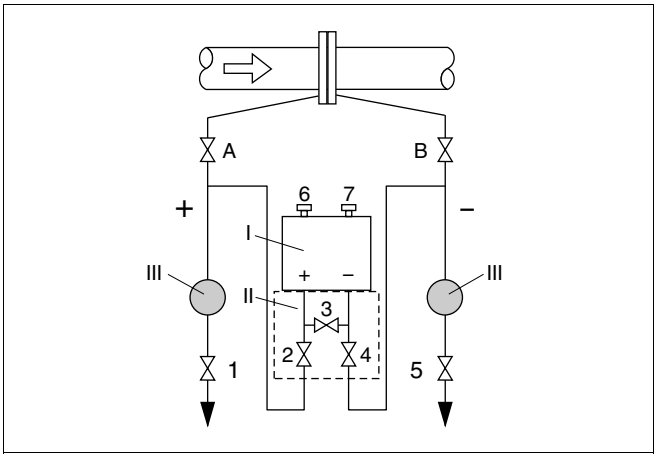


Fig. 50: Preferred installation for liquids

I DPT10
II 3-fold valve block
III Precipitator
1.5 Drain valves
2.4 Inlet valves
3 Breather valve
6, 7 Vent valves on DPT10
A, B Blocking valves

Prepare the adjustment

Proceed as follows:

1 Close valve 3

2 Fill measuring system with medium.

Open valves A, B, 2, 4: Medium flows in.

If necessary, clean the differential pressure lines: - with gases by blowing out with compressed air - with liquids by rinsing.[4)]

Close valve 2 and 4, block the instrument

Open valve 1 and 5

Close valve 1 and 5

3 Remove air from instrument:

Open valves 2 and 4: Medium flows in

Close valve 4: Minus side will be closed

Open valve 3: Equalisation plus and minus side

Briefly open valve 6 and 7, then close again: Fill the measuring instrument completely with the medium and remove air

4 Put measurement loop into operation:

Close valve 3: Separate plus and minus side

4) Arrangement with 5 valves.

Open valve 4: Connect minus side

Now:

Valves 1, 3, 5, 6 and 7 are closed[5)]

Valves 2 and 4 open

Valves A and B open (if available)

Then carry out adjustment, see chapter "*Set parameters*".

[5)] Valves 1, 3, 5: Configuration with 5 valves.

9 Maintenance and fault rectification

9.1 Maintain

Maintenance

When the instrument is used properly, no special maintenance is required in normal operation.

In some applications, product buildup on the separating diaphragms can influence the measuring result. Depending on the sensor and application, take precautions to ensure that heavy buildup, and especially a hardening thereof, is avoided.

9.2 Rectify malfunctions

Reaction when malfunctions occur

The operator of the system is responsible for taking suitable measures to rectify malfunctions.

Causes of malfunction

DPT10 offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measures to be taken are to check the output signals as well as to evaluate the error messages via the indicating and adjustment module. The procedure is described below. Further comprehensive diagnostics can be carried out on a PC with the software PACTware and the suitable DTM. In many cases, the causes can be determined this way and faults rectified.

Checking the 4 … 20 mA signal

Connect a handheld multimeter in the suitable measuring range according to the wiring plan.

? 4 … 20 mA signal not stable

- Level fluctuations

→ Set the integration time via the indicating and adjustment module or PACTware

? 4 … 20 mA signal missing

- Wrong connection to power supply

→ Check connection according to chapter "*Connection steps*" and if necessary, correct according to chapter "*Wiring plan*"

- No power supply

→ Check cables for breaks; repair if necessary

- Operating voltage too low or load resistance too high

→ Check, adapt if necessary

? Current signal greater than 22 mA or less than 3.6 mA
- electronics module or measuring cell defective
- → Exchange the instrument or send it in for repair

In Ex applications, the regulations for the wiring of intrinsically safe circuits must be observed.

Fault messages via the indicating/adjustment module

? E013
- no measured value available[6)]
- → Exchange the instrument or send it in for repair

? E017
- Adjustment span too small
- → repeat with modified values

? E036
- no operable sensor software
- → Carry out a software update or send instrument for repair

? E041
- Hardware error
- → Exchange the instrument or send it in for repair

Reaction after fault rectification

Depending on the failure reason and measures taken, the steps described in chapter "*Set up*" must be carried out again, if necessary.

9.3 Instrument repair

You can download a return form (24 KB) in the Internet from our homepage www.wika.com under the item "*Service*".

If a repair is necessary, please proceed as follows:

- Print and fill out one form per instrument
- If necessary, state a contamination
- Clean the instrument and pack it damage-proof
- Attach the completed form and probably a safety data sheet to the instrument
- Please contact the agency serving you for the address of the return shipment

By doing this you help us carry out the repair quickly and without having to call back for needed information.

6) Fault message can also appear if the pressure is higher than the nominal range.

10 Dismounting

10.1 Dismounting steps

Warning:
Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

10.2 Dispose

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the electronics to be easily separable.

WEEE directive 2002/96/EG
This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects to persons and environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

If you have no possibility to dispose of the old instrument professionally, please contact us concerning return and disposal.

11 Supplement

11.1 Technical data

General data

Pressure type	Differential pressure
Measuring principle	Piezoresistive
Communication interface	I^2C bus

Materials and weights

Material 316L corresponds to stainless steel 1.4404 or 1.4435

Materials, wetted parts	
– Process fitting with lateral flanges	C22.8, 316L, Alloy C276
– Separating diaphragm	316L, Alloy C-276, Tantalum, Alloy C-276 gold-rhodium coated
– Seal	FKM (Viton), FKM cleaned from oil and grease, FKM for oxygen application, PTFE, PTFE for oxygen application, NBR, copper, copper for oxygen application
– Closing screws	316L
Internal transmission liquid	Synthetic oil, Halocarbon oil[7)]
Materials, non-wetted parts	
– Electronics housing	Plastic PBT (polyester), Alu die-casting powder-coated
– External electronics housing	plastic PBT (Polyester)
– Socket, wall mounting plate external electronics housing	plastic PBT (Polyester)
– Seal between housing socket and wall mounting plate	TPE (fixed connected)
– Seal ring, housing cover	Silicone
– Inspection window in housing cover for indicating and adjustment module	Polycarbonate (UL-746-C listed)
– Screws and nuts for lateral flange	PN 160: hexagon screw ISO 4014-M12 x 90-A4, PN 420: hexagon nut ISO 4032-M12-A4-bs
– Ground terminal	316Ti/316L
– Connection cable with version IP 68 (1 bar)	PE, PUR, FEP
– Connection between IP 68 transmitter and external electronics housing	PUR
– Type plate support with IP 68 version on cable	PE hard

[7)] Halocarbon oil generally with oxygen applications, not with vacuum and absolute pressure measuring range < 1 bar_{abs}.

Max. torque screws mounting strap	30 Nm
Max. torque screws socket external housing	5 Nm (3.688 lbf ft)
Weight approx.	4.2 … 4.5 kg (9.26 … 9.92 lbs), depending on process fitting

Output variable

Output signal	4 … 20 mA/HART
HART output values	
– HART value (Primary Value)	Process pressure
– HART value (Secondary Value)	Temperature
Signal resolution	1.6 µA
Failure signal current output (adjustable)	mA-value unchanged 20.5 mA, 22 mA, < 3.6 mA
Max. output current	22 mA
Load	see load diagram under Power supply
Fulfilled NAMUR recommendations	NE 43

Dynamic behaviour output

Run-up time	≤ 20 s

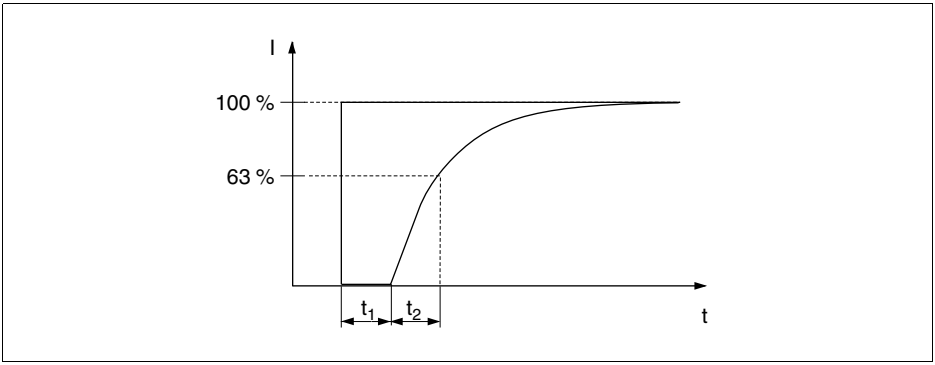


Fig. 51: Presentation of the dead time t_1 and the time constant t_2

The following specified total dead time applies to the 4 … 20 mA current output:

Version, nominal measuring range	Dead time t_1	Time constant t_2
Basic version 10 bar and 30 bar	100 ms	250 ms
Basic version 100 mbar	100 ms	180 ms
Basic version 500 mbar	100 ms	180 ms
Basic version, 3 bar	100 ms	180 ms
Basic version 16 bar and 40 bar	100 ms	180 ms

Version, nominal measuring range	Dead time t_1	Time constant t_2
Isolating diaphragm version, all nominal measuring ranges	Depending on the isolating diaphragm	Depending on the isolating diaphragm

Damping (63 % of the input variable) 0 … 999 s, adjustable

Additional output parameter - temperature

Processing is made via output signal HART multidrop, Profibus PA and Foundation Fieldbus

Range	-50 … +150 °C (-58 … +302 °F)
Resolution	1 °C (1.8 °F)
Accuracy in the range of 0 … +100 °C (+32 … +212 °F)	±3 K
Accuracy in the range of -50 … 0 °C (-58 … +32 °F) and +100 … +150 °C (+212 … +302 °F)	typ. ±3 K

Input variable

Measured variable Differential pressure, flow and level derived from it

Nominal range	Lower measurement limit	Upper measuring limit	Smallest adjustable span
10 mbar (1 kPa)	-10 mbar (-1 kPa)	+10 mbar (+1 kPa)	0.25 mbar (25 Pa)
30 mbar (3 kPa)	-30 mbar (-3 kPa)	+30 mbar (+3 kPa)	0.3 mbar (30 Pa)
100 mbar (10 kPa)	-100 mbar (-10 kPa)	+100 mbar (+10 kPa)	1 mbar (100 Pa)
500 mbar (50 kPa)	-500 mbar (-50 kPa)	+500 mbar (+50 kPa)	5 mbar (500 Pa)
3 bar (300 kPa)	-3 bar (-300 kPa)	+3 bar (+300 kPa)	30 mbar (3 kPa)
16 bar (1600 kPa)	-16 bar (-1600 kPa)	+16 bar (+1600 kPa)	160 mbar (16 kPa)
40 bar (4000 kPa)	-40 bar (-4000 kPa)	+40 bar (+4000 kPa)	400 mbar (40 kPa)

Reference conditions and actuating variables (similar to DIN EN 60770-1)

Reference conditions according to DIN EN 61298-1

- Temperature +18 … +30 °C (+64 … +86 °F)
- Relative humidity 45 … 75 %
- Air pressure 860 … 1060 mbar/86 … 106 kPa (12.5 … 15.4 psig)

Determination of characteristics	Limit point adjustment according to IEC 61298-2
Characteristics	linear
Position of the measuring cell	constant, in the range: horizontal ±1°
Span	based on the zero point

Diaphragm material	316L, Alloy C276, gold rhodium plated, Monel
Filling oil	Silicone oil
Material, lateral flanges	316L
Influence of the installation position basic version	≤ 4 mbar[8)9)]

A position-dependent zero-point shift can be corrected (see also chapter "*General installation instructions*" and "*Installation instructions, isolating diaphragm systems*").

Deviation determined according to the limit point method according to IEC 60770[10)]

Applies to **digital** interfaces (HART, Profibus PA, Foundation Fieldbus) as well as to **analogue** current output 4 … 20 mA. Specifications refer to the set span. Turn down (TD) is the ratio nominal measuring range/set span.

Reference accuracy - all versions

The following applies to square root extracted characteristics: The accuracy data of DPT10 are entered with factor 0.5 in the accuracy calculation of the flow.

Reference accuracy - Basic version

10 mbar, 30 mbar measuring cell

– Turn down 1 : 1	±0.15 % of the set span
– Turn down > 1 : 1	±0.15 % of the set span x TD

100 mbar measuring cell

– Turn down 1 : 1 up to 4 : 1	±0.075 % (±0.05 %) of the set span
– Turn down > 4 : 1	±(0,012 % x TD + 0.027) of the set span

Measuring cells ≥ 500 mbar

– Turn down 1 : 1 up to 15 : 1	±0.075 % (±0.05 %) of the set span
– Turn down > 15 : 1	±(0.0015 % x TD + 0.053) of the set span

Reference accuracy - Isolating diaphragm versions

100 mbar measuring cell

– Turn down 1 : 1 up to 4 : 1	±0.075 % (±0.05 %) of the set span + influence of the isolating diaphragm
– Turn down > 4 : 1	±(0.012 % x TD + 0.027) of the set span + influence of isolating diaphragm

Measuring cells ≥ 500 mbar

– Turn down 1 : 1 up to 15 : 1	±0.075 % (±0.05 %) of the set span + influence of the isolating diaphragm
– Turn down > 15 : 1	±(0.0015 % x TD + 0.053) of the set span + influence of the isolating diaphragm

8) Instrument is rotated vertically to the diaphragm axis.
9) For instruments with inert oil, the value doubles.
10) Incl. non-linearity, hysteresis and non-repeatability.

Influence of the product or ambient temperature

Applies to instruments in basic version with **digital** signal output (HART, Profibus PA, Foundation Fieldbus) as well as to instruments with **analogue** current output 4 … 20 mA. Specifications refer to the set span. Turn down (TD) = nominal measuring range/set span.

Temperature range	Measuring range	Thermal changes of the zero signal and the output span relating to the adjusted span
-10 … +60 °C (+14 … +140 °F)	10 mbar, 30 mbar	±(0.31 x TD + 0.06) %
	100 mbar	±(0.18 x TD + 0.02) %
	500 mbar, 3 bar	±(0.08 x TD + 0.05) %
	16 bar	±(0.1 x TD + 0.1) %
	16 bar	±(0.08 x TD + 0.05) %
-40 … +10 °C (-40 … +50 °F) +60 … +85 °C (+140 … +185 °F)	10 mbar, 30 mbar	±(0.45 x TD + 0.1) %
	100 mbar	±(0.3 x TD + 0.15) %
	500 mbar, 3 bar	±(0.12 x TD + 0.1) %
	16 bar	±(0.15 x TD + 0.2) %
	40 bar	±(0.37 x TD + 0.1) %

Applies also to instruments with **analogue** 4 … 20 mA current output and refers to the set span.

Thermal change, current output < 0.15 % at -40 … +80 °C (-40 … +176 °F)

Influence of the system pressure on the zero point and span

316L, Alloy C276-, Alloy C276 gold-rhodium coated diaphragm

Measuring cell	10 mbar	30 mbar	100 mbar	500 mbar
Influence of the system pressure to the zero point	±0.15 % of URL/ 7 bar	±0.35 % of URL/ 70 bar	±0.15 % of URL/ 70 bar	±0.075 % of URL/ 70 bar
Influence of the system pressure to the span	±0.035 % of URL/ 7 bar	±0.14 % of URL/ 70 bar	±0.14 % of URL/ 70 bar	±0.14 % of URL/ 70 bar

Measuring cell	3 bar	16 bar	40 bar
Influence of the system pressure to the zero point	±0.075 % of URL/7 bar	±0.075 % of URL/70 bar	±0.075 % of URL/70 bar
Influence of the system pressure to the span	±0.14 % of URL/7 bar	±0.14 % of URL/70 bar	±0.14 % of URL/70 bar

Tantalum diaphragm

Measuring cell	10 mbar	30 mbar	100 mbar	500 mbar
Influence of the system pressure to the zero point	±0.28 % of URL/ 7 bar	±0.70 % of URL/ 70 bar	±0.42 % of URL/ 70 bar	±0.14 % of URL/ 70 bar
Influence of the system pressure to the span	±0.28 % of URL/ 7 bar	±0.70 % of URL/ 70 bar	±0.42 % of URL/ 70 bar	±0.14 % of URL/ 70 bar

Measuring cell	3 bar	16 bar	40 bar
Influence of the system pressure to the zero point	±0.14 % of URL/7 bar	±0.14 % of URL/70 bar	±0.14 % of URL/70 bar
Influence of the system pressure to the span	±0.14 % of URL/7 bar	±0.14 % of URL/70 bar	±0.14 % of URL/70 bar

Total accuracy

Total Performance - Basic version

The specification "*Total Performance*" comprises non-linearity incl. hysteresis and non-repeatability, thermal change of the zero point and static pressure influence (p_{st} = 70 bar).

Total Performance

- 316L, Alloy, gold-rhodium diaphragm ±0.15 % of the set span[11)12)]
- Tantalum diaphragm ±0.30 % of the set span[13)14)]

Total Error - basic version

The specification "*Total Error*" comprises the longterm stability and the total performance.

Diaphragm material	Measuring range	Total Error
316L-, Alloy-, Gold-Rhodium	< 500 mbar	0.33 % of the measuring range end value/year
	from 500 mbar	0,20 % of the measuring range final value
Tantalum	< 500 mbar	0.48 % of the measuring range end value/year
	from 500 mbar	0.35 % of the measuring range end value/year

11) For measuring ranges ≥ 500 mbar up to TD 2 : 1
12) All specifications apply to the temperature range +10 … +60 °C (+50 … +140 °F).
13) For measuring ranges ≥ 500 mbar up to TD 2 : 1
14) All specifications apply to the temperature range +10 … +60 °C (+50 … +140 °F).

Heating time - all versions

Warm-up time	≤ 10 s

Long-term stability (similar to DIN 16086, DINV 19259-1 and IEC 60770-1)

Applies to **digital** interfaces (HART, Profibus PA, Foundation Fieldbus) as well as to **analogue** current output 4 … 20 mA. Specifications refer to the set span. Turn down (TD) = nominal measuring range/set span.

Measuring cells ≥ 500 mbar	±0.05 % of the nominal measuring range/year, ±0.125 % of the nominal measuring range/5 years
Measuring cells ≤ 500 mbar	±0.18 % of the nominal measuring range/year

Ambient conditions

Ambient, storage and transport temperature

– Standard version	-40 … +80 °C (-40 … +176 °F)
– Version for oxygen applications[15)]	-40 … +60 °C (-40 … +140 °F)
– Versions IP 66/IP 68 (1 bar) connection cable PE	-20 … +60 °C (-4 … +140 °F)
– Versions IP 66/IP 68 (1 bar) and IP 68, connection cable PUR	-20 … +80 °C (-4 … +176 °F)

Process conditions

The pressure and temperature specifications are used as overview. In general, the max. pressure for the pressure transmitter depends on the weakest (with regard to pressure) link. In detail, the respective specifications of the type label apply.

Process temperature limits, basic version as well as minus side with version with unilateral isolating diaphragm[16)17)]

With effective pressure lines longer than 100 mm	-40 … +120 °C (-40 … +248 °F)
With effective pressure lines longer than 100 mm, process fitting steel C22.8	-10 … +120 °C (+14 … +248 °F)

Seal material	Temperature limits
FKM	-20 … +85 °C (-4 … +185 °F)
PTFE	-40 … +85 °C (-40 … +185 °F)
NBR	-20 … +85 °C (-4 … +185 °F)
Copper	-40 … +85 °C (-40 … +185 °F)
Copper, cleaned for oxygen application	-20 … +60 °C (-4 … +140 °F)
FKM, oil and grease-free	-10 … +85 °C (+14 … +185 °F)

15) Up to 60 °C (140 °F).

16) For measuring cells with PN 420 a lower temperature application limit of -10 °C (+14 °F) applies.

17) For the version for oxygen application, note chapter "Oxygen applications".

Seal material	Temperature limits
FKM, cleaned for oxygen application	-10 … +60 °C (-4 … +140 °F)
PTFE, cleaned for oxygen application	-20 … +60 °C (-4 … +140 °F)

Process pressure limits

Nominal range	Nominal pressure	Overload unilateral	Overload bilateral
10 mbar (1 kPa)	160 bar (16000 kPa)	160 bar (16000 kPa)	240 bar (24000 kPa)
30 mbar (3 kPa)	160 bar (16000 kPa)	160 bar (16000 kPa)	240 bar (24000 kPa)
100 mbar (10 kPa)	160 bar (16000 kPa)	160 bar (16000 kPa)	240 bar (24000 kPa)
500 mbar (50 kPa)	160 bar (16000 kPa) 420 bar (42000 kPa)	160 bar (16000 kPa) 420 bar (42000 kPa)	240 bar (24000 kPa) 630 bar (63000 kPa)
3 bar (300 kPa)	160 bar (16000 kPa) 420 bar (42000 kPa)	160 bar (16000 kPa) 420 bar (42000 kPa)	240 bar (24000 kPa) 630 bar (63000 kPa)
16 bar (1600 kPa)	160 bar (16000 kPa) 420 bar (42000 kPa)	160 bar (16000 kPa) 420 bar (42000 kPa)	240 bar (24000 kPa) 630 bar (63000 kPa)
40 bar (4000 kPa)	160 bar (16000 kPa) 420 bar (42000 kPa)	Plus side: 160 bar (16000 kPa) 420 bar (42000 kPa) Minus side: 100 bar (10000 kPa)	240 bar (24000 kPa) 630 bar (63000 kPa)

Min. system pressure with all measuring ranges	0.1 $mbar_{abs}$ (10 Pa_{abs})
Vibration resistance	mechanical vibrations with 4 g and 5 … 100 Hz[18]
Shock resistance	Acceleration 100 g/6 ms[19]

Electromechanical data - version IP 66/IP 67

Cable entry/plug[20]

– Single chamber housing

- 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5

or:

- 1 x closing cap ½ NPT, 1 x blind plug ½ NPT

or:

- 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5

18) Tested according to the directives of the German Lloyd, GL directive 2. Not in the case of double chamber housing of precision cast stainless steel.
19) Tested according to EN 60068-2-27.
20) Depending on the version M12 x 1, according to DIN 43650, Harting, 7/8" FF.

– Double chamber housing	• 1 x cable entry M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5; plug M12 x 1 for the external indicating and adjustment unit (optional) or: • 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT, plug M12 x 1 for the external indicating and adjustment unit (optional) or: • 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5; plug M12 x 1 for the external indicating and adjustment unit (optional)
Spring-loaded terminals for wire cross-section up to	2.5 mm² (AWG 14)

Electromechanical data - version IP 66/IP 68 (1 bar)

Cable entry	
– Single chamber housing	• 1 x IP 68 cable gland M20 x 1.5; 1 x blind stopper M20 x 1.5 or: • 1 x closing cap ½ NPT, 1 x blind plug ½ NPT
Connection cable	
– Configuration	four wires, one suspension cable, one breather capillary, screen braiding, metal foil, mantle
– Wire cross-section	0.5 mm² (AWG 20)
– Wire resistance	< 0.036 Ω/m (0.011 Ω/ft)
– Tensile strength	> 1200 N (270 pounds force)
– Standard length	5 m (16.4 ft)
– Max. length	1000 m (3281 ft)
– Min. bending radius at 25 °C/77 °F	25 mm (0.985 in)
– Diameter approx.	8 mm (0.315 in)
– Colour - standard PE	Black
– Colour - standard PUR	Blue
– Colour - Ex-version	Blue

Electromechanical data - version IP 66/IP 68 with external electronics

Connection cable between IP 68 instrument and external housing:	
– Configuration	Four wires, screen braiding, inner cover, screen braiding, outer cover
– Wire cross-section	0.5 mm² (AWG 20)
– Standard length	5 m (16.40 ft)
– Max. length	25 m (82.02 ft)

– Min. bending radius at 25 °C/77 °F	25 mm (0.985 in)
– Diameter approx.	8 mm (0.315 in)
– Colour	Blue
Cable entry/plug[21)]	
– External housing	• 2 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5 or: • 1 x cable gland M20 x 1.5, 1 x plug (depending on version), 1 x blind stopper M20 x 1.5
Spring-loaded terminals for wire cross-section up to	2.5 mm^2 (AWG 14)

Indicating and adjustment module

Voltage supply and data transmission	through the sensor
Indication	LC display in dot matrix
Adjustment elements	4 keys
Protection rating	
– unassembled	IP 20
– mounted into the sensor without cover	IP 40
Materials	
– Housing	ABS
– Inspection window	Polyester foil

Voltage supply

Operating voltage	
– Non-Ex instrument	12 … 36 V DC
– EEx-ia instrument	12 … 30 V DC
– Exd instrument	18 … 36 V DC
Operating voltage with lighted indicating and adjustment module	
– Non-Ex instrument	20 … 36 V DC
– EEx-ia instrument	20 … 30 V DC
– EEx-d-ia instrument	20 … 36 V DC
Permissible residual ripple	
– < 100 Hz	U_{ss} < 1 V
– 100 Hz … 10 kHz	U_{ss} < 10 mV
Load	see diagram

21) Depending on the version M12 x 1, according to DIN 43650, Harting, 7/8" FF.

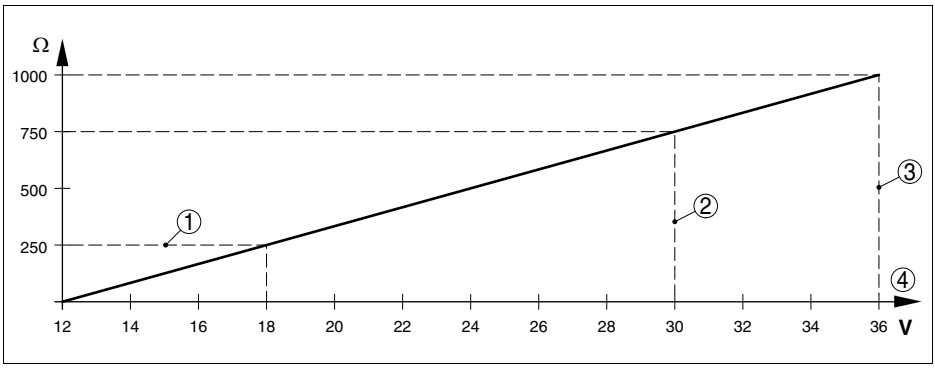


Fig. 52: Voltage diagram

1 HART load
2 Voltage limit EEx-ia instrument
3 Voltage limit non-Ex/Exd instrument
4 Operating voltage

Electrical protective measures

Protection rating	
– Housing, standard	IP 66/IP 67[22)]
– Aluminium and stainless housing (optionally available)	IP 68 (1 bar)[23)]
– Process component in IP 68 version	IP 68
– External housing	IP 65
Overvoltage category	III
Protection class	II

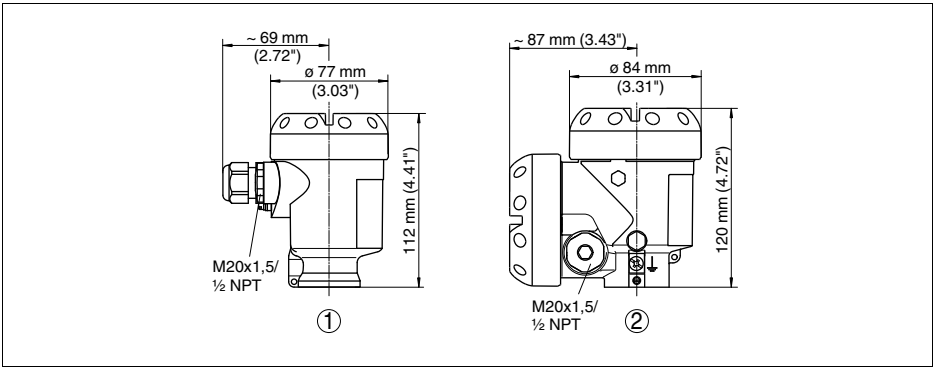
Approvals

Depending on the version, instruments with approvals can have different technical data. For these instruments, please note the corresponding approval documents. They are included in the scope of delivery.

22) Instruments with gauge pressure measuring ranges cannot detect the ambient pressure when submerged, e.g. in water. This can lead to falsification of the measured value.
23) Only with instruments with absolute pressure ranges.

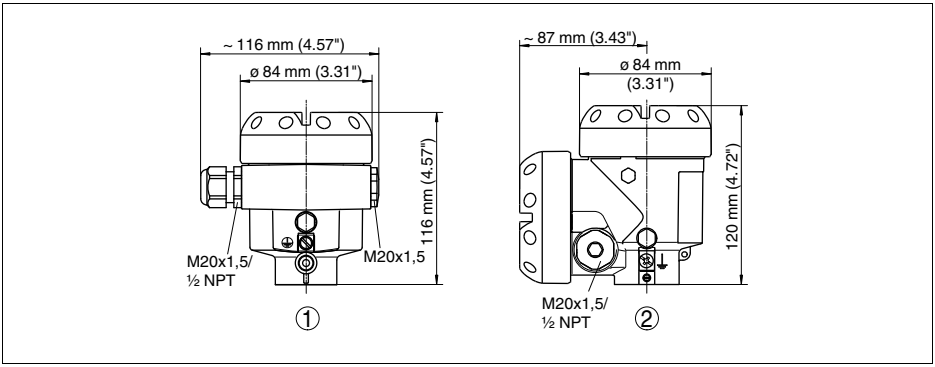
11.2 Dimensions

Plastic housing



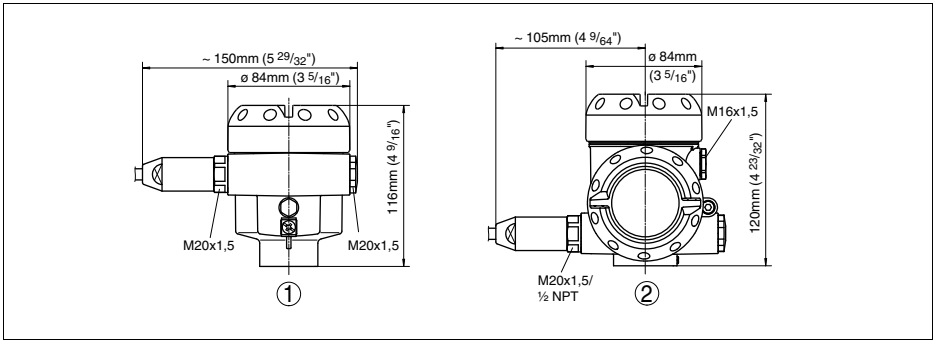
1 Single chamber version
2 Double chamber version

Aluminium housing



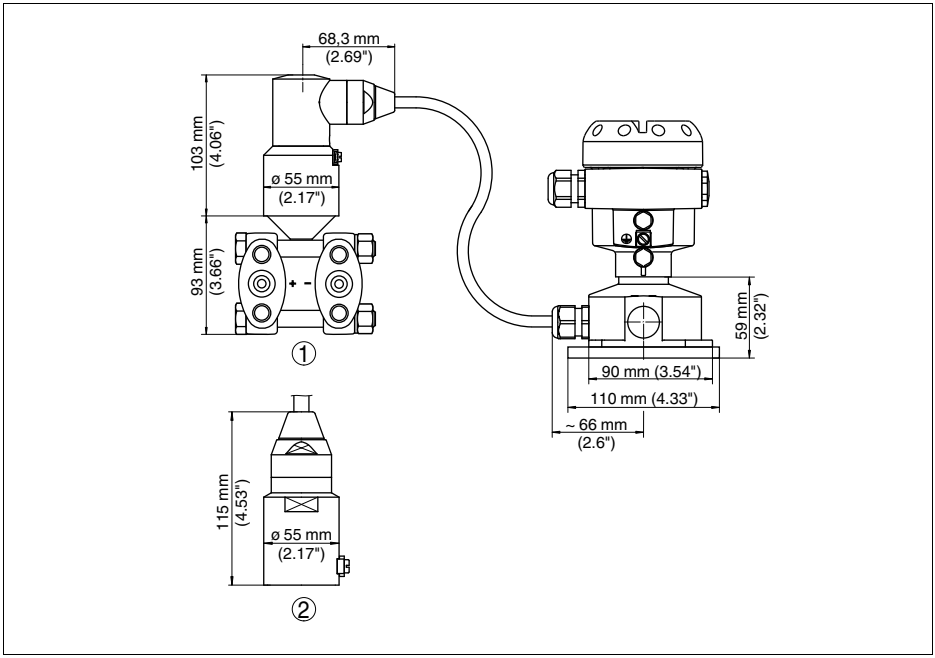
1 Single chamber version
2 Double chamber version

Aluminium housing in protection rating IP 66/IP 68 (1 bar)



1 Single chamber version, Aluminium
4 Double chamber housing Aluminium

Version IP 68 with external electronics



1 Lateral cable outlet
2 Axial cable outlet

Oval flange, connection ¼-18 NPT or RC ¼

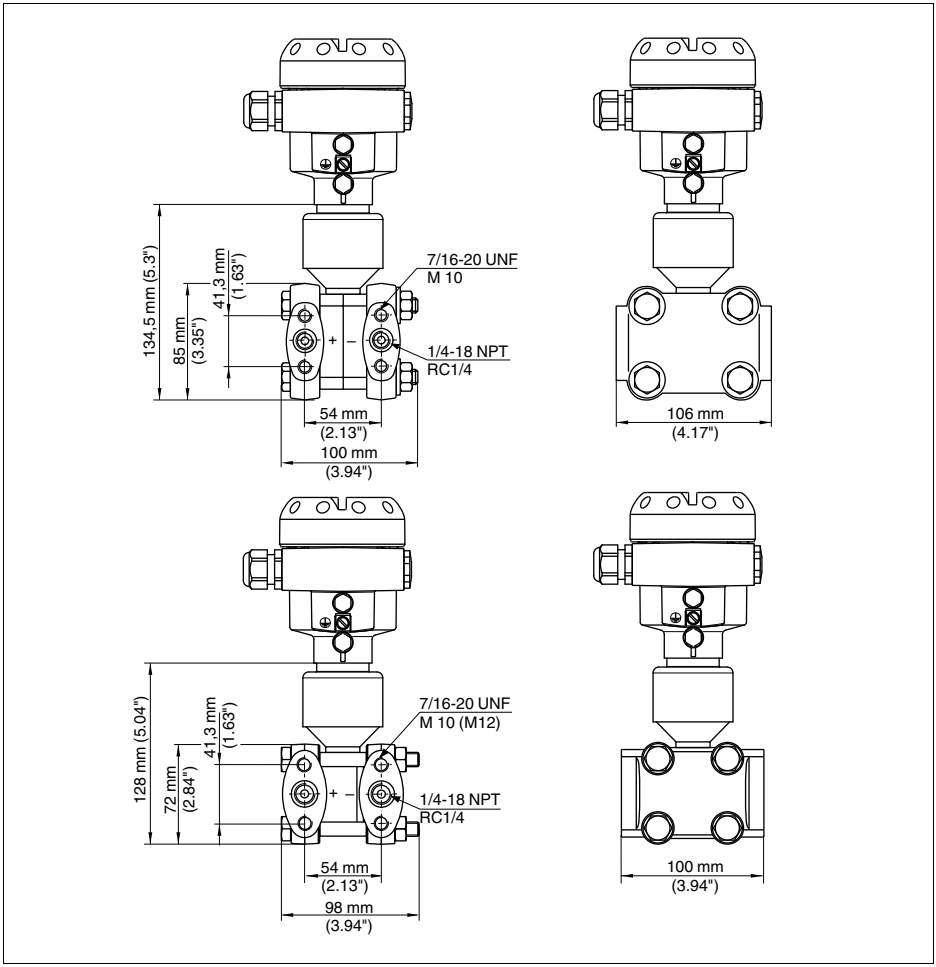


Fig. 57: Top: 10 mbar and 30 mbar measuring cell. Bottom: Measuring cell ≥ 100 mbar

Version	Connection	Fastening	Material	Equipment
B	1/4-18 NPT IEC 61518	7/16-20 UNF	Steel C 22.8	incl. 2 vent valves (316L)
D	1/4-18 NPT IEC 61518	7/16-20 UNF	AISI 316L	incl. 2 vent valves (316L)
F	1/4-18 NPT IEC 61518	7/16-20 UNF	Alloy C276	without valves/closing screws

Version	Connection	Fastening	Material	Equipment
U	RC 1/4	7/16-20 UNF	AISI 316L	incl. 2 vent valves (316L)
1	1/4-18 NPT IEC 61518	PN 160: M10, PN 420: M12	Steel C 22.8	incl. 2 vent valves (316L)
2	1/4-18 NPT IEC 61518	PN 160: M10, PN 420: M12	AISI 316L	incl. 2 vent valves (316L)
3	1/4-18 NPT IEC 61518	PN 160: M10, PN 420: M12	Alloy C276	without valves/closing screws

Oval flange, connection ¼-18 NPT or RC ¼, with lateral ventilation

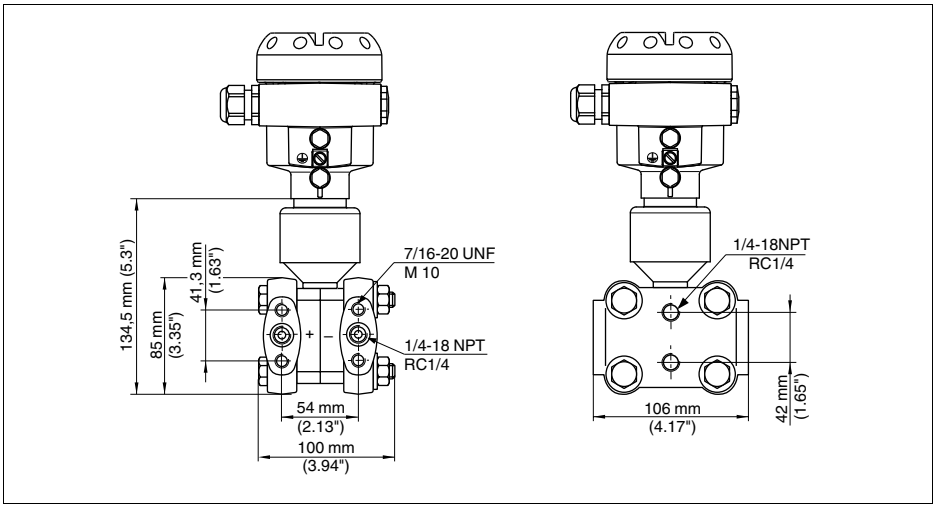


Fig. 58: 10 mbar and 30 mbar measuring cell

Version	Connection	Fastening	Material	Equipment
C	1/4-18 NPT IEC 61518	7/16-20 UNF	Steel C 22.8	incl. 4 closing screws (AISI 316L) and 2 ventilation valves
E	1/4-18 NPT IEC 61518	7/16-20 UNF	AISI 316L	incl. 4 closing screws (AISI 316L) and 2 ventilation valves
H	1/4-18 NPT IEC 61518	7/16-20 UNF	Alloy C276	without valves/closing screws

Version	Connection	Fastening	Material	Equipment
V	RC 1/4	7/16-20 UNF	AISI 316L	incl. 4 closing screws (AISI 316L) and 2 ventilation valves

Oval flange, prepared for isolating diaphragm connection

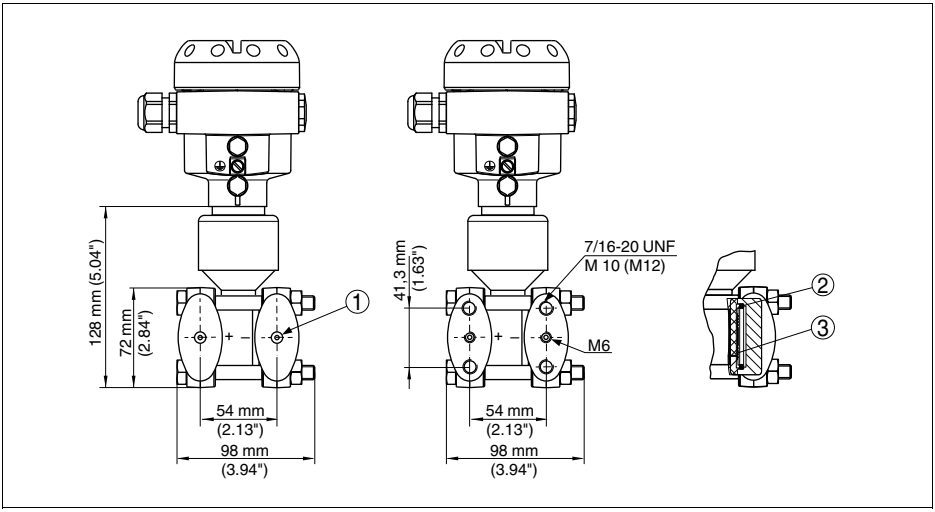


Fig. 59: left: Process fitting DPT10 prepared for isolating diaphragm connection. right: Position of the copper ring seal

1 Isolating diaphragm connection
2 Copper ring seal
3 Cup diaphragm

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